

## 12.0 Readers' Guide and Summary

### 12.0.1 Overview

Chapter 12 is organized much like the other chapters in this document, but because of the chapter's much greater scope, this guide is provided to help the reader navigate through the various components of the chapter.

The chapter is divided into three main sections.

- 12.1, *Environmental Setting/Affected Environment*
- 12.2, *Regulatory Setting*
- 12.3, *Environmental Consequences*

These sections parallel the same sections in other resource chapters. However, the complexity of the environmental analysis warrants further discussion.

### 12.0.2 Environmental Setting/Affected Environment

The *Environmental Setting/Affected Environment* section introduces the reader to historic trends in biodiversity of the study area, then describes the resources considered in each alternative's analysis, as summarized below.

#### 12.0.2.1 Natural Communities

The natural communities listed below are found within the terrestrial biology study area and are described in the *Environmental Setting/Affected Environment*. For simplicity, Cultivated Lands and Developed Lands, which are not natural communities but provide habitat for terrestrial species, are included in the Natural Communities category. No in-depth analysis was conducted of those two land cover types, but their value is addressed in the species-level analyses.

- Tidal Perennial Aquatic
- Tidal Brackish Emergent Wetland
- Tidal Freshwater Emergent Wetland
- Valley/Foothill Riparian
- Nontidal Perennial Aquatic
- Nontidal Freshwater Perennial Emergent Wetland
- Alkali Seasonal Wetland Complex
- Vernal Pool Complex
- Managed Wetland

- 1 • Other Natural Seasonal Wetland
- 2 • Grassland
- 3 • Inland Dune Scrub
- 4 • Cultivated Lands
- 5 • Developed Lands

6 Many of the natural communities are aquatic in nature, but they are considered in this chapter in the  
 7 context of their habitat values to terrestrial biological resources. Fish and other aquatic species are  
 8 considered in Chapter 11, *Fish and Aquatic Resources*.

### 9 **12.0.2.2 Special-Status Species**

10 Although the BDCP focuses on 45 covered terrestrial wildlife and plant species, these constitute a  
 11 subset of a considerably larger number of special-status wildlife and plant species analyzed in the  
 12 EIR/EIS pursuant to NEPA and CEQA (a total of 149 species). For this analysis, no organizational  
 13 distinction has been made between covered and noncovered species. However, as described in  
 14 detail in Section 12.3.2, *Methods for Analysis*, the analysis of effects on covered species is derived  
 15 from the analysis conducted for the BDCP as detailed in BDCP Appendix 5.J, *Effects on Natural*  
 16 *Communities, Wildlife, and Plants*.<sup>1</sup> Species-specific habitat models were developed for the BDCP  
 17 analysis; this level of modeling was not developed for noncovered species. The special-status species  
 18 addressed in this chapter are listed in Tables 12-2 and 12-3.

### 19 **12.0.3 Environmental Consequences**

20 This EIR/EIS analyzes 16 alternatives, including the No Action Alternative. Many of the alternatives  
 21 would have identical or very similar effects on terrestrial biological resources. Accordingly, this  
 22 section presents detailed analyses of five alternatives (Alternatives 1A, 1B, 1C, 4, and 9) that would  
 23 have varying effects associated with their significantly different footprints for the water conveyance  
 24 facilities. The other ten action alternatives (Alternatives 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, and 8) are  
 25 analyzed in a comparative, summary fashion, focusing on the slight differences in effect as compared  
 26 with the effects of the five alternatives analyzed in detail.

27 Impacts are numbered consecutively beginning with Impact BIO-1 for each alternative. The  
 28 numbering proceeds through each community and species to Impact BIO-186. Impacts BIO-187  
 29 through BIO-191 are discussed only at the very end of the chapter, in Sections 12.3.3.17, *Cumulative*  
 30 *Effects on Terrestrial Biological Resources*, and Section 12.3.3.18, *Effects on Other Conservation Plans*.

31 The BDCP itself amounts to a series of 22 numbered conservation measures, and nearly all BDCP  
 32 actions would stem from these conservation measures. Of primary importance in this chapter are  
 33 Conservation Measure (CM) 1, which regards construction and operation of water conveyance  
 34 facilities, and ten conservation measures (CM2–CM11) that focus on or that would otherwise effect  
 35 terrestrial habitat. In this chapter, these actions are identified by proper name (e.g., *CM4 Tidal*  
 36 *Natural Communities Restoration*), by the activity involved (e.g., tidal habitat restoration) or simply  
 37 by conservation measure number (e.g., CM4). The actions under CM2–CM11 are also often called  
 38 restoration, protection, management, or enhancement activities.

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<sup>1</sup> As described in Chapter 1, *Introduction*, Section 1.1, the full Draft EIR/EIS should be understood to include not only the EIR/EIS itself and its appendices but also the proposed BDCP documentation including all appendices.

## 12.0.4 Organization of Resources

Under each alternative, the biological resources are organized in the order shown below.

- **Natural Communities.** This heading is followed by a subheading for each of the communities listed above.
- **Wildlife Species.** Species are listed in taxonomic order: invertebrates, amphibians, reptiles, birds, and mammals. In some cases, where multiple species would be subject to the same or very similar impacts, several species are grouped together (e.g., nonlisted vernal pool invertebrates, least Bell's vireo and yellow warbler, Cooper's hawk and osprey).
- **Plant Species.** Plant species are grouped together by natural community (e.g., vernal pool plants, tidal wetland plants).
- **General Terrestrial Biology Effects.** This category examines the following resource topics.
  - Wetlands and Other Waters of the United States.
  - Shorebirds and Waterfowl.
  - Common Wildlife and Plants.
  - Invasive Plant Species.
  - Compatibility with Plans and Policies.

The cumulative effects analysis and the review of BDCP consistency with other habitat conservation plans/natural community conservation plans for all alternatives are provided in Sections 12.3.3.17, *Cumulative Effects on Terrestrial Biological Resources*, and Section 12.3.3.18, *Effects on Other Conservation Plans*.

## 12.0.5 Organization of Impacts

Each impact is presented as a NEPA analysis, using the appropriate terminology for presence or absence of adverse effects. A NEPA effects conclusion is included at the end of the NEPA evaluation. This analysis is followed by a CEQA conclusion, which is identified as such. The CEQA conclusion uses the terminology appropriate to describing the presence or absence of significant impacts. Where impacts are further divided into two timeframe conclusions—near-term and late long-term—these subheadings appear in both the NEPA and the CEQA analyses. The near-term effects, which would occur over the first 10 years of BDCP implementation, are addressed separately because they relate primarily to construction of the BDCP water conveyance facilities (CM1). Effects that would result from CM1 are analyzed at a project level. The late long-term effects are those associated with all actions that would occur over the 50-year timeframe of the BDCP.

## 12.0.6 Summary of Effects

Chapter 12 is lengthy due to the large number of alternatives analyzed and the large number of special-status plants and wildlife that are addressed. This summary has been prepared to highlight the major effects of the action alternatives, primarily in tabular form, and to provide a method of comparing effects of the action alternatives. The No Action Alternative is discussed in a brief narrative without quantitative comparisons. The differences in effects that would be created by the alternatives are determined primarily by the location, capacity, and design of water conveyance

1 facilities and the amount and type of habitat restoration and enhancement proposed under the  
 2 BDCP. Table 3-1 in Chapter 3, *Description of Alternatives*, provides a brief overview of the action  
 3 alternatives.

4 The major differences the alternatives have in water conveyance facilities and  
 5 restoration/enhancement elements are summarized below. This discussion is followed by a  
 6 discussion of the differences in effects the alternatives would have on natural communities,  
 7 jurisdictional wetlands and other waters, and special-status wildlife and plant species. All of the  
 8 discussions of wildlife and plants in this summary section focus solely on special-status species,  
 9 which are defined as species that are protected by federal or state law or species that are considered  
 10 sensitive by federal, state, or local resource agencies. See Section 12.1.3, *Special-Status Species*, for a  
 11 comprehensive definition.

## 12 **12.0.6.1 Differences Among the Alternatives**

### 13 **Pipeline/Tunnel Designs**

14 Alternatives 1A, 2A, 3, 4, 5, 6A, 7, and 8 would all use a pipeline/tunnel design to convey water. With  
 15 the exception of Alternatives 5 and 7, they would have the same habitat restoration and  
 16 enhancement program. The alternatives differ in capacity to divert water from the north Delta;  
 17 therefore, they would have different numbers of intakes: Alternatives 1A, 2A, and 6A each would  
 18 convey up to 15,000 cubic feet per second (cfs) of Sacramento River flow from the north Delta to  
 19 Clifton Court Forebay, and each alternative would use five intakes on the eastern bank of the river.  
 20 Effects of Alternatives 1A, 2A, and 6A on terrestrial biological resources would be similar.

21 Alternatives 4, 7, and 8 would convey up to 9,000 cfs of Sacramento River flow in tunnels and would  
 22 use three intakes on the eastern bank of the river. Alternative 4 was designed to maximize the use of  
 23 public lands and minimize the size of the forebay in the north Delta; therefore, Alternative 4  
 24 conveyance facilities would have a somewhat different location than Alternative 7 or 8 facilities.  
 25 Alternative 4 would place reusable tunnel material (RTM, the material generated by excavating the  
 26 water conveyance tunnels) in 6-foot high storage sites, while all other alternatives are assumed to  
 27 place the material in 10-foot high storage sites (see Chapter 3, Section 3.6.1.2, *Conveyance Facilities*,  
 28 for further details). Use of 10-foot-high RTM storage sites could substantially reduce effects in  
 29 storage site areas under Alternative 4. Alternatives 7 and 8 would have identical conveyance facility  
 30 footprints, but Alternative 7 would include an additional 20 linear miles of channel margin habitat  
 31 enhancement on Delta waterways and 10,000 acres of additional seasonally inundated floodplain  
 32 restoration along south Delta rivers.

33 Alternative 3 would have a capacity to divert 6,000 cfs of Sacramento River flow and would use two  
 34 eastern bank intakes, and Alternative 5 would divert 3,000 cfs using one eastern bank intake. Tidal  
 35 habitat restoration would be limited to 25,000 acres under Alternative 5, compared with the 65,000  
 36 acres for all other alternatives.

### 37 **Other Designs**

38 Alternatives 1B, 2B, and 6B would use five intakes on the eastern bank of the Sacramento River to  
 39 divert 15,000 cfs of Sacramento River flow into a canal on the eastern edge of the Delta that feeds  
 40 into Clifton Court Forebay. These alternatives would have the same restoration and enhancement  
 41 program as all alternatives except Alternatives 5 and 7. Alternatives 1B, 2B, and 6B would have  
 42 similar effects on terrestrial biological resources.

1 Alternatives 1C, 2C, and 6C would use five intakes on the western bank of the Sacramento River to  
 2 divert 15,000 cfs into a new canal and tunnel system on the western edge of the Delta. These  
 3 alternatives would have the same restoration and enhancement program as all alternatives except  
 4 Alternatives 5 and 7. Alternatives 1C, 2C, and 6C would have similar effects on terrestrial biological  
 5 resources.

6 The separate corridors design of Alternative 9 would include construction of two screened intakes  
 7 on the Sacramento River near Walnut Grove, operable barriers and other water control structures  
 8 within Delta waterways, and dredging of Middle River and Victoria Canal to create facilities that  
 9 would convey 15,000 cfs of water across the Delta to the export pumps using existing channels.  
 10 Delta fish migration corridors would be separated from water diversion flows. Alternative 9 would  
 11 have the same restoration and enhancement program as all alternatives except Alternatives 5 and 7.

## 12 **12.0.6.2 Comparison of the Effects of the Alternatives**

### 13 **Effects on Natural Communities and Cultivated Lands**

14 Implementing the alternatives would effect natural communities and cultivated lands in two  
 15 primary ways. Large acreages of natural communities would be permanently eliminated by the  
 16 construction of water conveyance facilities. These lands would no longer be available as plant and  
 17 wildlife habitat. Even larger acreages of natural communities would be lost through conversion from  
 18 one habitat type to another as part of restoration activities; these lands would not be lost as wildlife  
 19 habitat, but the mix of habitats in the study area would be substantially modified. To fully  
 20 understand the effects of the alternatives, the permanent losses and conversions must be considered  
 21 in combination.

### 22 **Losses Resulting from Construction of Facilities and Conversion Associated with Restoration**

23 Natural community acreages that would be permanently or temporarily lost or converted by  
 24 implementation of the action alternatives are summarized in Table 12-ES-1. Generally speaking, the  
 25 east alignment alternatives (1B, 2B and 6B) would have the largest effect on terrestrial natural  
 26 communities (91,725–92,301 acres, depending on the intakes involved) because of their large large  
 27 water conveyance canal. The west alignment alternatives (1C, 2C and 6C) would have a smaller  
 28 effect (86,961–86,966 acres). The effects of the pipeline/tunnel alternatives other than Alternative 5  
 29 (1A, 2A, 3, 4, 6A, 7 and 8) would be smaller still (76,600–80,305 acres). The separate corridors  
 30 alternative (9) would have a slightly smaller overall effect than most of the pipeline/tunnel  
 31 alternatives (74,413 acres). Alternative 5, which is also a pipeline/tunnel alternative, would have  
 32 the smallest effect (40,989 acres) of all alternatives because of its much smaller tidal restoration  
 33 goal.

34 Differences among the pipeline/tunnel alternatives result mainly from differences in the amount of  
 35 restoration. The largest loss or conversion of acreage would occur under Alternative 7, which would  
 36 include 10,000 additional acres of floodplain restoration; Alternative 5 would have the smallest  
 37 effect because it would restore 40,000 fewer acres of tidal habitat.

38 The location of the conveyance facilities determines the type of effect on natural communities. The  
 39 west alignment facilities would be located in the western Delta, including areas west of Clifton Court  
 40 Forebay where the facilities would affect substantially greater alkali seasonal wetland complex  
 41 acreage than the other alternatives would affect. The alkali seasonal wetland complex natural  
 42 community affected by the west alignment alternatives would be 88–94 acres, while the range for

1 the other alternatives would be 59–75 acres (Table 12-ES-1). Acreages of effects on other natural  
2 community types are broadly overlapping among east alignment, west alignment, and  
3 pipeline/tunnel alternatives, with generally smaller effects under the pipeline/tunnel alternatives.  
4 The exception would be Alternative 7 because of its 10,000 acres of additional seasonally inundated  
5 floodplain restoration.

6 Among the pipeline/tunnel alternatives, Alternative 7 would have the largest effect on the  
7 valley/foothill riparian, nontidal perennial aquatic, and grassland natural communities and  
8 cultivated lands because of its additional 10,000 acres of restoration. Alternative 4 would have the  
9 largest effect of the tunnel/pipeline alternatives on tidal perennial aquatic, tidal freshwater  
10 emergent wetland, nontidal freshwater perennial emergent wetland, alkali seasonal wetland  
11 complex, and vernal pool complex natural communities because RTM storage sites would be 6 feet  
12 high instead of 10 feet high as in all other alternatives (see Chapter 3, Section 3.6.1.2, *Conveyance*  
13 *Facilities*), and because of additional RTM storage facilities near Clifton Court Forebay, where vernal  
14 pool complex and alkali seasonal wetland complex natural communities would be affected. The  
15 effects on wetlands and open water would be substantially reduced for Alternative 4 if 10-foot-high  
16 RTM storage sites were used. Of the pipeline/tunnel alternatives, Alternative 5, which would have a  
17 smaller restoration area and only one water intake, would have the smallest effect on the  
18 valley/foothill riparian, nontidal perennial aquatic, and grassland natural communities and  
19 cultivated lands (Table 12-ES-1). Alternative 5 would also provide the smallest benefit to tidal  
20 wetland habitats because of the alternative's smaller tidal marsh restoration area.

21 Alternative 9 would have a smaller effect on cultivated lands than all other alternatives other than  
22 Alternative 5 would have. However, Alternative 9 would have the largest effect on tidal perennial  
23 aquatic, tidal freshwater emergent wetland, valley/foothill riparian, and nontidal freshwater  
24 emergent wetland natural communities. These Alternative 9 losses would be primarily temporary  
25 and associated with the initial dredging of Middle River and Victoria Canal to improve their flow  
26 capacity.

27 Under the No Action Alternative, there would be no water conveyance facilities construction effects  
28 on natural communities. Also, there would be no restoration, protection, and enhancement of  
29 natural communities resulting from the other BDCP conservation measures. Several programs that  
30 are under way or in the planning stages to increase wetlands and riparian natural communities in  
31 the absence of a BDCP will benefit natural communities and increase wildlife-friendly agriculture in  
32 the study area. The potential exists for levee deterioration and repairs, global climate change and  
33 associated sea level rise, and seismic activity that damages levees to result in substantial loss of  
34 terrestrial natural communities and cultivated land habitats.

1 **Table 12-ES-1. Direct Effects of Alternatives on Natural Communities and Cultivated Lands in the Terrestrial Biological Resources Study Area**  
 2 **(acres)<sup>a</sup>**

Alternative <sup>c</sup>	Natural Community Type/Cultivated Land <sup>b</sup>												Total
	Tidal Perennial Aquatic	Tidal Freshwater Emergent Wetland	Valley/Foothill Riparian	Nontidal Perennial Aquatic	Nontidal Freshwater Perennial Emergent Wetland	Alkali Seasonal Wetland Complex	Vernal Pool Complex	Managed Wetland	Other Natural Seasonal Wetland	Grassland	Cultivated Land		
1A	224	21	892	290	128	72	375	13,899	0	2,907	58,369	77,178	
1B	221	27	896	293	137	72	375	13,838	0	3,087	72,778	91,725	
1C	186	9	932	311	131	94	437	13,959	4	3,007	67,895	86,966	
2A	232	20	893	290	128	72	375	13,899	0	2,923	58,875	77,708	
2B	249	33	910	293	138	72	375	13,840	0	3,117	73,273	92,301	
2C	186	9	932	311	131	88	437	13,959	4	3,008	67,895	86,961	
3	184	18	873	290	128	72	375	13,899	0	2,869	57,891	76,600	
4 <sup>d</sup>	297	24	869	333	133	75	403	13,850	0	2,948	58,325	77,258	
5	161	18	721	168	79	59	272	7,454	0	2,468	29,587	40,989	
6A	224	21	892	290	128	72	375	13,899	0	2,907	58,369	77,178	
6B	221	27	896	293	137	72	375	13,838	0	3,087	72,778	91,725	
6C	186	9	932	311	131	94	437	13,959	4	3,007	67,895	86,966	
7	200	22	957	334	128	73	375	13,899	0	2,975	61,341	80,305	
8	193	20	879	290	128	72	375	13,899	0	2,890	58,060	76,807	
9 <sup>e</sup>	546	193	1,116	269	151	72	372	13,846	0	2,756	55,091	74,413	

Notes:

<sup>a</sup> Direct effects include both permanent and temporary effects.

<sup>b</sup> Tidal Brackish Emergent Wetland (all approximately 1 acre) and Inland Dune Scrub (no effect) are not shown.

<sup>c</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

<sup>d</sup> Alternative 4 also includes 2,026 acres of dredging of open water in Clifton Court Forebay not shown in the table.

<sup>e</sup> Alternative 9 also includes dredging of 517 acres of open water in Middle River and Victoria and North Canals not shown in the table.

Identifies the greatest and least natural community acreage affected by the alternatives.

## 1 **Increases Associated with Protection and Restoration**

2 The principal intent of the BDCP is to improve habitat conditions for covered special-status species  
3 in the Plan Area through habitat protection, restoration, and enhancement. These improvements  
4 would occur incrementally over the life of the Plan's restoration activities. Table 12-ES-2  
5 summarizes the BDCP's natural communities protection and restoration acreage goals. Each of the  
6 alternatives analyzed in this chapter, except Alternatives 5 and 7 and the No Action Alternative,  
7 would include these goals. The 69,275 acres of natural communities and cultivated land protection  
8 and the 83,839 acres of natural communities restoration (Table 12-ES-2), combined with the Plan's  
9 goals of enhancement of all new conservation lands, would provide a substantial offset for the  
10 temporary and permanent losses associated with facilities construction and habitat conversion of  
11 these alternatives, which would range from 74,413 to 92,301 acres. The tidal, nontidal, riparian, and  
12 seasonal wetland expansions would provide long-term benefits for most special-status and common  
13 species in the Plan Area. The exception would be habitat for species that rely heavily on modified  
14 landscapes, including cultivated lands and managed wetland. The acreages of habitat provided by  
15 these land cover types would be reduced; however, the value they provide would be enhanced by  
16 the management activities that would accompany habitat protection and restoration actions  
17 directed by the Plan.

18 Because it would restore 40,000 fewer acres of tidal marsh, Alternative 5 would have a much  
19 smaller cultivated lands and managed wetland conversion effect compared with the other  
20 alternatives. However, Alternative 5 would also provide 40,000 fewer acres of tidal wetland and  
21 transitional uplands than the other alternatives would offer. Nonetheless, Alternative 5 would  
22 provide for expansions of all the key natural communities targeted by the Plan when compared with  
23 Existing Conditions and the No Action Alternative. Alternative 7 would result in a more substantial  
24 reduction of cultivated lands and managed wetland in the Plan Area, but a net expansion of the key  
25 natural communities addressed in the Plan. Also, Alternative 7 would provide an additional 10,000  
26 acres of riparian and floodplain habitat associated with seasonally inundated floodplain restoration  
27 when compared with the other alternatives.

28 The No Action Alternative does not include a comprehensive plan for expansion of natural  
29 communities that provide habitat for special-status and common species found in the Plan Area.  
30 There would be no large-scale conversions of cultivated lands and managed wetland; there would be  
31 numerous disassociated projects and programs that would result in relatively small losses of these  
32 managed lands in favor of wetland and riparian habitats.



1

**Table 12-ES-2. Natural Communities Protection and Restoration Included in the BDCP**

BDCP Conservation Measures	Acres
<b>Protection</b>	
<i>CM3: Natural Communities Protection and Restoration</i>	
Valley/foothill riparian	750
Vernal pool complex	600
Alkali seasonal wetland complex	150
Grassland	8,000
Managed wetland	1,500
Managed wetland (natural community)	6,600
Cultivated lands (non-rice)	48,125
Cultivated lands (rice)	500
Cultivated lands (rice or equivalent)	3,000
Nontidal marsh	50
<b>Total Protection</b>	<b>69,275</b>
<b>Restoration</b>	
<i>CM4: Tidal Natural Communities Restoration<sup>a</sup></i>	
Tidal brackish emergent wetland	6,000
Tidal freshwater emergent wetland	24,000
Tidal perennial aquatic (below mean lower low water)	N/A
Tidal wetland of any type and transitional uplands	35,000
Subtotal: Tidal wetland restoration	65,000
<i>CM5: Seasonally Inundated Floodplain Restoration<sup>b</sup></i>	10,000
<i>CM6: Channel Margin Enhancement<sup>c</sup></i>	20 miles
<i>CM7: Riparian Natural Community Restoration</i>	5,000
<i>CM8: Grassland Natural Community Restoration</i>	2,000
<i>CM9: Vernal Pool and Alkali Seasonal Wetland Complex Restoration</i>	
Vernal pool complex	67
Alkali seasonal wetland complex	72
<i>CM10: Nontidal Marsh Restoration</i>	
Nontidal marsh	1,200
Managed wetland	500
<b>Total Restoration</b>	<b>83,839</b>
<b>Total Protection and Restoration</b>	<b>153,114</b>

<sup>a</sup> Under Alternative 5, 25,000 acres of tidal habitat would be restored under CM4.

<sup>b</sup> Under Alternative 7, 20,000 acres of seasonally inundated floodplain would be restored under CM5.

<sup>c</sup> Under Alternative 7, 40 linear miles of channel margin habitat would be enhanced under CM6.

2

## 1 Effects on Wetlands and Other Waters of the United States

2 The estimated area of fill of wetlands and other waters of the United States potentially under  
 3 jurisdiction of the U.S. Army Corps of Engineers (jurisdictional waters) would be largest under  
 4 Alternative 9 (Table 12-ES-3). Fill of jurisdictional waters would be greater under the west  
 5 alignment alternatives than under the east alignment or pipeline/tunnel alternatives. The fill under  
 6 the east alignment and pipeline/tunnel alternatives would be largely overlapping. Of these  
 7 alternatives, the fill would be largest under Alternative 4 with the use of 6-foot high RTM storage  
 8 sites. However, if 10-foot-high storage sites were used (see Chapter 3, Section 3.6.1.2, *Conveyance*  
 9 *Facilities*), Alternative 4 would result in the least fill of potential jurisdictional wetlands (Table 12-  
 10 ES-3). Under Alternative 4, a larger area of nonwetland waters of the United States would be filled  
 11 than under the other pipeline/tunnel alternatives. Implementing Alternative 5 would result in the  
 12 least fill of nonwetland waters of the United States.

13 Under the No Action Alternative, there would be no water conveyance facilities construction effects  
 14 on jurisdictional wetlands and other waters of the United States. Also, there would be no restoration,  
 15 protection, and enhancement of jurisdictional wetlands resulting from the BDCP's other  
 16 conservation measures. Jurisdictional wetlands could increase in area and habitat value under  
 17 several programs that are under way or in the planning stages to increase wetlands and riparian  
 18 natural communities in the absence of a BDCP. The potential exists for levee deterioration and  
 19 repairs, global climate change and associated sea level rise, and seismic activity that damages levees  
 20 to result in substantial loss of jurisdictional wetlands.

21 **Table 12-ES-3. Fill of Wetlands and Other Waters of the United States from Construction of Water**  
 22 **Conveyance Facilities (CM1) (acres)**

Alternative <sup>a,b</sup>	Wetlands	Other Waters of the U.S.	Total Waters of the U.S.
1A	89	264	353
1B	84	469	553
1C	135	498	633
2A	89	264	353
2B	84	469	553
2C	135	501	636
3	81	221	303
4 (6 foot) <sup>c, d</sup>	109	373	482
4 (10 foot) <sup>d, e</sup>	47	293	339
5	81	201	281
6A	89	264	353
6B	84	469	553
6C	135	498	633
7	86	231	317
8	86	231	317
9 <sup>f</sup>	465	584	1,050

Notes:

<sup>a</sup> Fill includes both permanent and temporary effects.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

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<sup>c</sup> Alternative 4 is designed with RTM storage sites 6 feet in height.

<sup>d</sup> Alternative 4 includes 2,026 acres of dredging effects on Clifton Court Forebay not shown in the table.

<sup>e</sup> Estimated acreages affected if RTM storage sites are 10 feet high.

<sup>f</sup> Alternative 9 includes channel dredging of 517 acres of open water in Middle River and Victoria and North Canals not shown in the table.

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## 2 **Effects on Invertebrates**

3 The acreages of effects on special-status invertebrate species' habitats that would result from BDCP  
4 alternatives are summarized below in Table 12-ES-4. BDCP restoration, protection, and  
5 management actions would account for the majority of the effects on invertebrates.

6 Most of the effects on vernal pool species and valley elderberry longhorn beetle would result from  
7 tidal natural communities restoration. Alternative 5, which would have 40,000 fewer acres of tidal  
8 habitat restoration, would have substantially less effect on vernal pool species and valley elderberry  
9 longhorn beetle relative to the other alternatives. The other 14 action alternatives differ in their  
10 effects on these species based on the alternatives' respective conveyance alignments (vernal pool  
11 species and valley elderberry longhorn beetle), the number and location of intakes along the  
12 Sacramento River (valley elderberry longhorn beetle), and the amount of floodplain restoration  
13 (valley elderberry longhorn beetle under Alternative 7). As seen in Table 12-ES-4, the west  
14 alignment (Alternatives 1C, 2C, and 6C) would result in the greatest effect on vernal pool  
15 crustaceans. This greater effect would be due to construction of a canal west of Clifton Court  
16 Forebay that would pass through an area of vernal pool complex and alkali seasonal wetland that  
17 could provide vernal crustacean habitat. Alternative 9 effects on valley elderberry longhorn beetle  
18 would be the greatest due to effects on riparian habitat along Middle River. The 10,000-acre  
19 increase in seasonal floodplain restoration under Alternative 7 would result in effects on 100  
20 additional acres of suitable valley elderberry longhorn beetle habitat. Alternative 7 would be the  
21 same as Alternative 8 except for Alternative 7's greater floodplain restoration and channel margin  
22 enhancement. However, the seasonal floodplain restoration under Alternative 7 would by the late  
23 long-term result in an overall benefit to valley elderberry longhorn beetle by creating approximately  
24 3,000 additional acres of riparian habitat. The remaining alternatives differ in their effects on valley  
25 elderberry longhorn beetle due to the number and location of intakes along the Sacramento River.

26 All of the alternatives except Alternatives 5 and 7 would have the same potential effects on  
27 Sacramento and Antioch Dunes anthicid beetles as result of tidal habitat restoration, seasonal  
28 floodplain restoration, and channel margin enhancement. Alternative 5 would have less potential  
29 effect on the anthicid beetles due to decreased tidal habitat restoration (40,000 acres less) and  
30 Alternative 7 would have greater potential effect due to a greater amount of seasonal floodplain  
31 restoration (10,000 more acres) and channel margin enhancement (20 more miles). However  
32 Alternative 7's additional restoration in the long run would likely increase the amount of habitat  
33 available to anthicid beetles beyond that produced under the other alternatives.

34 Alternative 5 would also have fewer potential effects on delta green ground beetle if tidal habitat  
35 restoration is excluded from the Cache Slough area. All of the other alternatives would have the  
36 same potential effect on delta green ground beetle.

37 Potential effects on callippe silverspot butterfly would be the same for all alternatives because  
38 potential grassland protection and management, which could result in effects on the species, would  
39 not differ.

1 Under the No Action Alternative, the effects on invertebrate species resulting from water  
2 conveyance facilities construction would not occur and neither would the benefits and contributions  
3 to recovery resulting from the other BDCP conservation measures. As seen in Table 12-7 in Section  
4 12.3.3.1, there are several existing or proposed conservation projects under the No Action  
5 Alternative that could benefit some of the invertebrate species, including riparian habitat and  
6 floodplain restoration projects. However, many of these projects and plans do not provide the same  
7 magnitude of conservation and contribution to recovery of invertebrate species within the Delta  
8 that the BDCP offers and were not developed in consideration of the needs and interests of all of the  
9 covered invertebrate species addressed by the BDCP. Vernal pool crustacean habitat could be  
10 negatively affected by some of the proposed tidal habitat restoration projects listed in Table 12-7.  
11 Also, these No Action Alternative projects would not provide the same contributions to invertebrate  
12 species recovery that the BDCP offers because the BDCP would provide habitat protection and  
13 restoration beyond what is typically required for mitigation of individual projects.

1 **Table 12-ES-4. Direct Effects of Alternatives on Invertebrate Habitat in the Terrestrial Biological Resources Study Area (acres)<sup>a</sup>**

Alternative <sup>b</sup>	Vernal Pool Crustaceans <sup>c</sup>	Valley Elderberry Longhorn Beetle	Nonlisted Vernal Pool Invertebrates <sup>d</sup>	Sacramento and Antioch Dunes Anthicid Beetles	Delta Green Ground Beetle <sup>e</sup>	Callippe Silverspot Butterfly <sup>e</sup>
1A	375	1,560	375	NA	0	0
1B	376	1,544	376	NA	0	0
1C	453	1,550	453	NA	0	0
2A	375	1,572	375	NA	0	0
2B	376	1,572	376	NA	0	0
2C	453	1,551	453	NA	0	0
3	375	1,526	375	NA	0	0
4	405	1,561	405	NA	0	0
5	272	1,269	272	NA	0	0
6A	375	1,560	375	NA	0	0
6B	376	1,544	376	NA	0	0
6C	453	1,550	453	NA	0	0
7	375	1,634	375	NA	0	0
8	375	1,533	375	NA	0	0
9	372	1,872	372	NA	0	0

<sup>a</sup> Direct effects include both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

<sup>c</sup> Vernal pool crustaceans are California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

<sup>d</sup> Nonlisted vernal pool invertebrates are Blennosperma vernal pool andrenid bee, hairy water flea, Ricksecker’s water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle.

<sup>e</sup> Alternatives could affect species but would not result in a loss of potential habitat. This potential affect would be the same for all alternatives.

NA = Not Applicable (alternatives have a potential for a loss of habitat that can’t be quantified).

  Identifies the greatest and least species habitat acreage affected by the alternatives.

2

## 1 **Effects on Amphibians and Reptiles**

2 The effects on habitat for special-status amphibian and reptile species' resulting from the BDCP  
3 alternatives are summarized below in Table 12-ES-5. All of these species would be affected by the  
4 different conveyance facilities and some species would be largely affected by tidal habitat  
5 restoration (California tiger salamander, giant garter snake, and western pond turtle). Other  
6 conservation measures that would affect amphibians and reptiles are Yolo Bypass fisheries  
7 enhancement, seasonal floodplain restoration, and recreational improvements. Some of these  
8 species, such as California red-legged frog, San Joaquin coachwhip, and Blainville's horned lizard,  
9 have restricted ranges and, therefore, would be affected by only a few of the conservation measures.

10 California red-legged frog would be affected only by water conveyance facilities of the alternatives  
11 and by proposed recreational improvements because most other conservation activities would not  
12 extend into its range in the study area. The west alignment alternatives (1C, 2C, and 6C) and  
13 Alternatives 4 and 9 would have substantially less effect on California red-legged frog relative to the  
14 other alternatives because Alternatives 1C, 2C, 4, 6C, 9 would have smaller borrow and spoils areas  
15 to the southwest of Clifton Court Forebay, where habitat for a number of amphibian and reptile  
16 species exists.

17 California tiger salamander would mostly be affected by tidal habitat restoration and, to a lesser  
18 extent, by the conveyance facilities construction, Yolo Bypass fisheries improvement, recreational  
19 facility improvements, and conservation hatchery construction. The alternatives differ from one  
20 another in their potential to affect California tiger salamander mostly based on the location and size  
21 of borrow and spoils areas to the southwest of Clifton Court Forebay. Most of the pipeline/ tunnel  
22 alternatives (1A, 2A, 3, 6A, 7, and 8) and the eastern alignment alternatives (1B, 2B, and 6B) would  
23 result in the greatest effect on California tiger salamander because of their construction activity  
24 southwest of Clifton Court Forebay. The reduced amount of tidal habitat restoration under  
25 Alternative 5 would result in substantially less effect when compared with all of the other  
26 alternatives.

27 Giant garter snake would be affected mostly by tidal natural communities restoration and  
28 conveyance facilities construction, and to a lesser extent by Yolo Bypass fisheries improvements and  
29 seasonal floodplain restoration. Effects of the alternatives would differ from one another mostly  
30 based on their respective alignments and Alternative 5's reduced amount of tidal habitat  
31 restoration. Other smaller differences would result from the number and location of intakes along  
32 the Sacramento River. Alternative 9 would result in the greatest effect on giant garter snake due to  
33 the larger amounts of in-channel work that would be required; however, most of the Alternative 9  
34 effects would be temporary. The east conveyance alignment (Alternatives 1B, 2B, and 6B) would  
35 also result in large effects on giant garter snake and would create barriers to movement across the  
36 species' range in the study area. Alternative 5, which would restore 40,000 fewer acres tidal habitat,  
37 would result in substantially less effect than the other alternatives (roughly 900–1,000 fewer acres  
38 impacted). However, giant garter snake would also have substantially less tidal freshwater emergent  
39 wetland habitat restored under Alternative 5 relative to the other alternatives.

40 For most of the alternatives, western pond turtle would be affected primarily by tidal habitat  
41 restoration, and secondarily by conveyance facilities construction and Yolo Bypass fisheries  
42 improvements. Alternatives 4 and 9 would have substantial effects resulting from conveyance  
43 facilities construction associated with the dredging of aquatic habitat (Clifton Court Forebay for  
44 Alternative 4 and Middle River for Alternative 9). Alternative 4 would have the greatest effect on

1 western pond turtle relative to the other alternatives; however, nearly all of this difference is  
2 associated with the temporary effect of dredging Clifton Court Forebay, which is identified as  
3 aquatic habitat for the species. Alternative 5 would have the least effect on western pond turtle  
4 because of the alternative's 40,000 fewer acres of tidal habitat restoration.

5 Among the other special-status reptiles, only San Joaquin coachwhip and Blainville's horned lizard  
6 would experience quantifiable effects. Only conveyance facilities construction would affect  
7 coachwhip and horned lizard. The west alignment (Alternatives 1C, 2C, and 6C) would have the  
8 largest effect of all of the alternatives, but only by 12 to 15 acres for most alternatives. Alternative 9  
9 would have substantially less effect than all of the other alternatives because it would generally  
10 avoid modifying grassland habitat in the vicinity of Clifton Court Forebay.

11 Under the No Action Alternative, there would be no water conveyance facilities construction effects  
12 on amphibian and reptile species. Also, there would be no benefits and contributions to recovery  
13 from the BDCP's other conservation measures. As seen in Table 12-7 in Section 12.3.3.1, there are  
14 several existing or proposed conservation activities under the No Action Alternative that could  
15 benefit amphibian and reptile species, including grassland and vernal pool protection and  
16 management as part of several approved or pending habitat conservation plans and natural  
17 community conservation plans that overlap with the Plan Area. However, many of these projects  
18 and plans do not provide the same magnitude of reptile and amphibian habitat conservation and  
19 contribution to recovery within the Delta that the BDCP offers and were not developed in  
20 consideration of the needs and interests of all of the covered reptile and amphibian species that the  
21 BDCP addresses.

1 **Table 12-ES-5. Direct Effects of Alternatives on Amphibian and Reptile Habitat in the Terrestrial Biological Resources Study Area (acres)<sup>a</sup>**

Alternative <sup>b</sup>	California Red-Legged Frog	California Tiger Salamander	Giant Garter Snake	Western Pond Turtle	Special-Status Reptiles <sup>c</sup>
1A	183	797	3,902	1,669	338
1B	184	801	4,180	1,749	335
1C	97	716	4,020	1,703	350
2A	183	795	3,918	1,667	338
2B	184	801	4,233	1,779	335
2C	97	716	4,021	1,703	350
3	183	797	3,843	1,657	338
4	70	672	3,990	4,004	301
5	183	554	3,011	1,315	338
6A	183	797	3,902	1,669	338
6B	184	801	4,180	1,749	335
6C	97	716	4,020	1,703	350
7	183	797	3,997	1,751	338
8	183	797	3,850	1,666	338
9	24	634	4,497	2,708	30

<sup>a</sup> Direct effects include both permanent and temporary

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

<sup>c</sup> Special-status reptiles are silvery legless lizard, San Joaquin coachwhip, and Blainville's horned lizard.

Identifies the most and least species habitat acreage affected by the alternatives.

2



## 1       **Effects on Birds**

2       The conversion of special-status bird species habitat that would result from the BDCP alternatives is  
3       summarized below in Table 12-ES-6. Each of the BDCP conservation measures that would actively  
4       convert habitat under all of the alternatives would affect at least one of the bird species addressed in  
5       this EIR/EIS. The conveyance facilities for the alternatives generally account for a small fraction of  
6       the effects relative to the other conservation measures. However, the conveyance facilities under the  
7       east alignment (Alternatives 1B, 2B, and 6B) and Alternative 9 would contribute substantially to  
8       effects on birds. For most alternatives, tidal habitat restoration generally would account for the  
9       majority of the effects on birds. The decrease in tidal natural communities restoration associated  
10      with Alternative 5 (40,000 fewer acres) would decrease the effects on most bird species habitat, in  
11      some cases by as much as half; however, species that utilize tidal habitats would also not receive the  
12      long-term benefits of the restored tidal habitat that would occur under the other alternatives. The  
13      larger acreage of seasonal floodplain restoration under Alternative 7 would not result in a  
14      substantial increase in effects on birds relative to the other alternatives, but Alternative 7's  
15      additional riparian and freshwater emergent wetland habitat restoration would provide greater  
16      benefits relative to the other alternatives.

17      California clapper rail, black tern, and bank swallow habitat would be affected similarly by all of the  
18      alternatives.

19      Black rail, least Bell's vireo, yellow warbler, Suisun song sparrow, saltmarsh common yellowthroat,  
20      western yellow-billed cuckoo, yellow-breasted chat, Cooper's hawk, osprey, cormorants, herons,  
21      egrets, least bittern, white-faced ibis, and Modesto song sparrow would be affected generally the  
22      same (impacted habitat acreages would differ by 1% to 3%) under all of the alternatives except  
23      Alternatives 5 and 9. With its 40,000 fewer acres of tidal habitat restoration, Alternative 5 would  
24      effect substantially fewer acres of habitat (20 to 50% less) for these species relative to the other  
25      alternatives. However, black rail, Suisun song sparrow, and saltmarsh common yellowthroat would  
26      also not receive the long-term benefit of the additional tidal habitat restoration offered by the other  
27      alternatives. Alternative 9 would result in greater effect on most of these species because  
28      Alternative 9 would have greater effects on valley/foothill riparian, tidal freshwater emergent  
29      wetland, and nontidal freshwater perennial emergent wetland natural communities; however, most  
30      of the riparian habitat affected by Alternative 9 is considered low-value habitat for these species.

31      Greater and lesser sandhill cranes, Swainson's hawk, tricolored blackbird, western burrowing owl,  
32      white-tailed kite, golden eagle, ferruginous hawk, short-eared owl, northern harrier, mountain  
33      plover, California horned lark, grasshopper sparrow, loggerhead shrike, and yellow-headed  
34      blackbird all have their impact acreages trend in the same manner across the alternatives. The east  
35      alignment, in particular Alternative 2B (larger effects associated with intake pipeline construction),  
36      would result in the largest effect on these species because of the east alignment's greater effects on  
37      cultivated lands and grasslands. Alternative 5, with its decreased tidal habitat restoration, would  
38      result in the least effects on these species of all of the alternatives but it would also provide fewer  
39      benefits to those species that use tidal habitat.

40      California least tern would be effected by all of the alternatives similarly except for Alternatives 4, 5,  
41      and 9. Alternatives 4 and 9 would result in substantially larger effects because of dredging activities  
42      in tidal perennial aquatic habitat; however these effects would be temporary. Alternative 5 would  
43      result in less effect on this habitat because of the alternative's reduced tidal habitat restoration.

1 Under the No Action Alternative, there would be no water conveyance facilities construction effects  
2 on bird species. Also, there would be no benefits and contributions to recovery from the BDCP's  
3 other conservation measures. As seen in Table 12-7 in Section 12.3.3.1, there are several existing or  
4 proposed conservation projects under the No Action Alternative that could benefit bird species,  
5 including tidal habitat restoration, freshwater emergent wetland restoration, grassland protection,  
6 and riparian habitat restoration, as well as the management of agricultural lands and managed  
7 wetlands for the benefits of wildlife. However, many of these projects and plans do not provide the  
8 same magnitude of conservation and contribution to recovery of bird habitat within the Delta that  
9 the BDCP offers and were not developed in consideration of the needs and interests of all of the  
10 covered bird species addressed by the BDCP. Furthermore, under the No Action Alternative, both  
11 gradual and catastrophic natural phenomena, such as continued Delta island land subsidence, levee  
12 degradation and failure from floods or seismic events, and climate change, could affect the  
13 grasslands, cultivated lands, and valley/foothill riparian habitat used by birds in the study area (see  
14 Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies*). These changes  
15 could, in the long term, benefit species that use open waters and tidal wetlands, but habitat in the  
16 Delta would decline for those species that use cultivated lands, grasslands, and riparian vegetation.

1 **Table 12-ES-6. Direct Effects of Alternatives on Bird Habitat in the Terrestrial Biological Resources Study Area (acres)<sup>a</sup>**

Alternative <sup>b</sup>	California Black Rail	California Clapper Rail	California Least Tern	Greater Sandhill Crane	Lesser Sandhill Crane	Least Bell's Vireo & Yellow Warbler	Suisun Song Sparrow & Saltmarsh Yellowthroat	Swainson's Hawk	Tricolored Blackbird	Western Burrowing Owl	Western Yellow-Billed Cuckoo	White-Tailed Kite	Yellow-Breasted Chat
1A	3,132	77	243	7,372	15,881	812	3,688	55,306	43,612	45,576	666	59,567	811
1B	3,131	77	240	13,186	23,861	819	3,688	65,739	51,616	51,889	673	69,935	817
1C	3,133	77	204	8,113	21,495	823	3,688	62,459	48,341	50,433	677	66,281	822
2A	3,131	77	250	7,596	16,106	811	3,688	55,551	43,865	45,818	664	59,801	811
2B	3,131	77	266	13,473	24,151	829	3,688	66,035	51,904	52,156	682	70,240	830
2C	3,132	77	204	8,113	21,495	823	3,688	62,460	48,341	50,433	677	66,283	823
3	3,131	77	202	7,036	15,546	803	3,688	54,989	43,337	45,297	658	59,245	803
4	3,146	77	2,341	8,120	16,045	817	3,688	56,215	44,795	46,309	671	60,470	815
5	1,542	77	178	6,886	8,444	661	1,637	29,519	25,293	26,445	545	31,203	661
6A	3,132	77	243	7,372	15,881	812	3,688	55,306	43,612	45,576	666	59,567	811
6B	3,131	77	240	13,186	23,861	819	3,688	65,739	51,616	51,889	673	69,935	817
6C	3,133	77	204	8,113	21,495	823	3,688	62,459	48,341	50,433	677	66,281	822
7	3,131	77	217	7,110	15,623	858	3,688	57,965	45,303	47,870	699	62,052	858
8	3,131	77	211	7,110	15,620	809	3,688	55,040	43,414	45,366	662	59,301	809
9	3,439	77	1,082	5,022	13,845	1,047	3,688	53,516	42,161	44,287	890	57,835	1,047

<sup>a</sup> Direct effects include both permanent and temporary effects.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

Identifies the most and least species habitat acreage affected by the alternatives.

2

3

Alternative <sup>b</sup>	Cooper's Hawk & Osprey	Golden Eagle & Ferruginous Hawk	Cormorants, Herons & Egrets	Short-Eared Owl & Northern Harrier	Redhead & Tule Greater White-Fronted Goose	Mountain Plover	Black Tern	California Horned Lark & Grasshopper Sparrow	Least Bittern & White-Faced Ibis	Loggerhead Shrike	Modesto Song Sparrow	Bank Swallow	Yellow-Headed Blackbird
1A	677	29,424	893	50,507	NA	29,424	260	29,424	13,185	49,812	3,607	0	44,007
1B	707	34,581	897	57,123	NA	34,581	260	34,581	13,119	59,116	3,568	0	49,126
1C	732	33,637	933	55,870	NA	33,637	260	33,637	13,108	56,881	3,704	0	48,071
2A	681	29,365	893	50,493	NA	29,365	260	29,365	13,185	49,996	3,608	0	43,945
2B	714	34,602	910	57,223	NA	34,602	260	34,602	13,126	60,863	3,588	0	49,153
2C	733	33,638	932	55,870	NA	33,638	260	33,638	13,108	56,882	3,704	0	48,071
3	665	29,183	873	50,263	NA	29,183	260	29,183	13,183	49,529	3,586	0	43,757
4	677	29,693	871	50,709	NA	29,693	260	29,693	13,113	50,422	3,544	0	44,220
5	577	16,129	721	27,117	NA	16,129	260	16,129	6,805	25,773	2,998	0	24,121
6A	677	29,424	893	50,507	NA	29,424	260	29,424	13,185	49,812	3,607	0	44,007
6B	707	34,581	897	57,123	NA	34,581	260	34,581	13,119	59,116	3,568	0	49,126
6C	732	33,637	933	55,870	NA	33,637	260	33,637	13,108	56,881	3,704	0	48,071
7	743	30,720	957	52,434	NA	30,720	260	30,720	13,185	52,462	3,673	0	45,323
8	668	29,270	879	50,348	NA	29,270	260	29,270	13,185	49,581	3,594	0	43,843
9	760	28,690	1,116	49,811	NA	28,690	260	28,690	13,109	48,125	3,974	0	43,382

<sup>a</sup> Direct effects include both permanent and temporary effects.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

NA = Not applicable, no quantitative analysis conducted.

  Identifies the most and least species habitat acreage affected by the alternatives.

## 1 **Effects on Mammals**

2 The effects of the alternatives on habitat for special-status mammal species are summarized below  
3 in Table 12-ES-7. There is no general trend in mammal effects across the alternatives. Because the  
4 majority of the mammal groups addressed in this EIR/EIS have restricted ranges within the study  
5 area, the various conservation measures would affect mammals differently based on their specific  
6 location. Riparian brush rabbit and riparian woodrat are restricted to the southernmost portion of  
7 the study area and, therefore, would be primarily affected by seasonal floodplain restoration in this  
8 area and by the water conveyance facilities. Salt marsh harvest mouse and Suisun shrew within the  
9 study area are restricted to Suisun Marsh and would only be affected by tidal habitat restoration.  
10 San Joaquin fox and American badger are only considered to occur in the grasslands in the  
11 southwest portion of the study area and would thus only be affected by the conveyance facilities  
12 construction. San Joaquin pocket mouse and bat species roosting habitat could occur throughout the  
13 study area and thus would be affected by various conservation measures.

14 As noted above, riparian brush and riparian woodrat would be affected primarily by floodplain  
15 restoration and the conveyance facilities, and to a lesser degree by tidal habitat restoration. The  
16 west conveyance alignment (Alternatives 1C, 2C, and 6C) would result in the least effect on riparian  
17 brush rabbit due to the location of the alignment in the southern portion of the study area. Riparian  
18 woodrat would be least affected by Alternative 5 due to the decrease in tidal habitat restoration.  
19 Alternative 7, with its increased floodplain restoration, would result in the greatest effects on both  
20 species; however, in the long term, riparian brush rabbit and riparian woodrat would benefit from  
21 the expansion of riparian habitat with well-developed understory that would occur as part of  
22 Alternative 7's 10,000 acres of additional seasonal floodplain restoration.

23 Salt marsh harvest mouse and Suisun shrew would be affected similarly by all alternatives except  
24 Alternative 5. Though this alternative would decrease the effects on these species, it also would limit  
25 the amount of habitat converted from managed wetland to tidal brackish emergent wetland, thereby  
26 decreasing the benefit to these species in the long term.

27 San Joaquin kit fox and American badger would be affected only by the water conveyance facilities of  
28 the alternatives. The west alignment (Alternatives 1C, 2C, and 6C) would have the largest effect on  
29 these species. Alternative 9, the Through Delta/Separate Corridors alternative, would effect 90%  
30 less habitat acreage than the other alternatives.

31 As mentioned above, San Joaquin pocket mouse and bat species would be affected by multiple  
32 conservation measures because of their broad habitat distribution. Therefore, a decrease in the  
33 areal extent of any one of these measures associated with a particular alternative would result in a  
34 decrease in effect on these species. The largest effect on the mouse and the bat species would result  
35 from Alternative 2B because of the areal extent of the east alignment and the number and location of  
36 intakes. The least effect on these species would result from Alternative 5 due to the decrease in the  
37 number of intakes and the reduction in tidal habitat restoration.

38 Under the No Action Alternative, there would be no water conveyance facilities construction effects  
39 on mammal species. Also, there would be no benefits and contributions to recovery from the other  
40 BDCP conservation measures. As seen in Table 12-7 in Section 12.3.3.1, there are several existing or  
41 proposed conservation projects under the No Action Alternative that could benefit mammal species,  
42 including tidal habitat restoration, grassland protection, and riparian habitat restoration. However,  
43 many of these projects and plans do not provide the same magnitude of conservation and

1 **Table 12-ES-7. Direct Effects of Alternatives on Mammal Habitat in the Terrestrial Biological Resources Study Area (acres)<sup>a</sup>**

Alternative <sup>b</sup>	Riparian Brush Rabbit	Riparian Woodrat	Salt Marsh Harvest Mouse	Suisun Shrew	San Joaquin Kit Fox & American Bader	San Joaquin Pocket Mouse	Special-Status Bat Species (roosting only) <sup>c</sup>
1A	349	84	6,968	401	348	2,906	2,215
1B	338	85	6,968	401	345	3,087	2,578
1C	245	85	6,968	401	361	3,008	2,250
2A	349	84	6,968	401	348	2,923	2,302
2B	338	85	6,968	401	345	3,117	2,672
2C	245	85	6,968	401	361	3,008	2,249
3	347	84	6,968	401	348	2,869	2,089
4	343	84	6,968	401	318	2,948	2,050
5	311	75	3,746	164	348	2,468	1,130
6A	349	84	6,968	401	348	2,907	2,214
6B	338	85	6,968	401	345	3,087	2,578
6C	245	85	6,968	401	361	3,007	2,249
7	470	158	6,968	401	348	2,975	2,277
8	349	84	6,968	401	348	2,890	2,175
9	372	87	6,968	401	33	2,756	2,140

<sup>a</sup> Direct effects include both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

<sup>c</sup> Special-status bat species are big brown bat, California myotis, hoary bat, little brown myotis, Mexican free-tailed bat, silver-haired bat, western red bat, western small-footed myotis, Yuma myotis, canyon bat, pallid bat, Townsend's big-eared bat, western mastiff bat; only effects on roosting habitat shown here.

Identifies the most and least species habitat acreage affected by the alternatives.

2

1 contribution to recovery of mammal habitat within the Delta that the BDCP offers and were not  
2 developed in consideration of the needs and interests of all of the covered mammal species  
3 addressed by the BDCP.

#### 4 **Effects on Plants**

5 Because the distribution of covered plant species in the study area is only partially documented, a  
6 habitat model was created for each species to ensure that effects on the species were not  
7 underestimated. The modeled habitat is essentially a distribution map for each species based on the  
8 characteristics, such as vegetation types, soil types, land forms, and elevation ranges, of habitat in  
9 which the species are known to occur. In the effects analysis, these habitat models served as  
10 surrogates for the amount and location of habitat for each covered plant species. The determination  
11 of effects of the alternatives on special-status plant species rely on the habitat models. The effects  
12 are summarized below by the natural communities in which the species occur. Tables 12-ES-8  
13 through 12-ES-14 summarize these effects.

#### 14 **Vernal Pool Plants**

15 Seventeen covered and noncovered special-status vernal pool plant species are present in the study  
16 area. Under the pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7, and 8) and the east alignment  
17 alternatives (1B, 2B, and 6B), no known occurrences of these species would be affected, and  
18 modeled vernal pool habitat would be affected primarily by tidal natural communities restoration  
19 activities. Under the modified pipeline/tunnel alternative (Alternative 4), one occurrence of alkali  
20 milk-vetch and 30 additional acres of modeled vernal pool habitat would be affected by construction  
21 of the water conveyance facilities. The greatest effects on vernal pool plant species would occur  
22 under the west alignment alternatives (1C, 2C, and 6C); three occurrences of alkali milk-vetch and  
23 two occurrences of Ferris' goldfields and 77 additional acres of modeled vernal pool habitat would  
24 be affected by construction of the west alignment water conveyance features. Alternative 9 would  
25 have the fewest effects on vernal pool plant species, affecting no known occurrences of these  
26 species, and affecting modeled vernal pool habitat only through tidal natural communities  
27 restoration activities.

#### 28 **Alkali Seasonal Wetland Plants**

29 Eight covered and noncovered special-status alkali seasonal wetland plant species occur in the study  
30 area. Under all alternatives except Alternative 5, tidal natural communities restoration activities  
31 would affect one occurrence of San Joaquin spearscale, one occurrence of Heckard's peppergrass,  
32 and modeled habitat for San Joaquin spearscale, brittlescale, and heartscale. Under the  
33 pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7, and 8) and the east alignment alternatives (1B, 2B,  
34 and 6B), one occurrence of crownscale and 69 additional acres of modeled habitat for San Joaquin  
35 spearscale would be affected by construction of the water conveyance facilities. Under the modified  
36 pipeline/tunnel alternative (Alternative 4), two occurrences of crownscale, 82 additional acres of  
37 modeled habitat for San Joaquin spearscale, and 74 additional acres of modeled habitat for Delta  
38 button-celery would be affected by construction of the water conveyance facilities. The greatest  
39 effects on alkali seasonal wetland plant species would result from the west alignment alternatives  
40 (1C, 2C, and 6C); two additional occurrences of San Joaquin spearscale, one occurrence of heartscale,  
41 and one occurrence of recurved larkspur, as well as 144 additional acres of modeled San Joaquin  
42 spearscale habitat and 109 additional acres of modeled Delta button-celery habitat, would be  
43 affected by construction of the water conveyance features. Alternative 9 would have the fewest

1 effects on alkali seasonal wetland plant species because construction of the water conveyance  
2 facilities would affect no known occurrences and no modeled habitat of alkali seasonal wetland  
3 plants.

#### 4 **Grassland Plants**

5 Thirteen covered and noncovered special-status grassland plant species occur in the study area.  
6 Under all alternatives, one occurrence of Carquinez goldenbush and four acres of modeled habitat  
7 for Carquinez goldenbush would be affected by tidal habitat restoration, and one occurrence of  
8 Parry's rough tarplant would be affected by Yolo Bypass fisheries enhancements. Under the  
9 pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7, and 8), the east alignment alternatives (1B, 2B, and  
10 6B), Alternative 4, and Alternative 9, no additional covered and noncovered grassland plant species  
11 would be affected by construction of the water conveyance facilities. However, under the west  
12 alignment alternatives (1C, 2C, and 6C), one occurrence of Keck's checker-mallow and one  
13 occurrence of caper-fruited tropidocarpum could be affected by construction of the water  
14 conveyance facilities.

#### 15 **Valley/Foothill Riparian Plants**

16 Four covered and noncovered special-status valley/foothill riparian plant species occur in the study  
17 area. All alternatives would have the same effects on these species as a result of floodplain levee  
18 construction and increased frequency and duration of flooding.

#### 19 **Tidal Wetland Plants**

20 Eight covered and noncovered special-status tidal wetland plant species are present in the study  
21 area. The effects of restoration actions would be similar under all alternatives. The pipeline/tunnel  
22 alternatives (1A, 2A, 3, 5, 6A, 7, and 8) would have the fewest effects on covered and noncovered  
23 tidal wetland plants resulting from construction of the water conveyance facilities. The modified  
24 pipeline/tunnel alternative (Alternative 4), the east alignment alternatives (1B, 2B, and 6B), and the  
25 west alignment alternatives (1C, 2C, and 6C) would have slightly greater effects on covered and  
26 noncovered tidal wetland plants resulting from construction of the water conveyance facilities.  
27 Construction of the Alternative 9 water conveyance facilities would have much greater effects on  
28 covered and noncovered tidal wetland plants than the water conveyance facilities of the other  
29 alternatives.

#### 30 **Inland Dune Plants**

31 Five noncovered special-status inland dune plant species are present in the study area. None of the  
32 alternatives would affect the inland dune plants.

#### 33 **Nontidal Wetland Plants**

34 Six noncovered special-status nontidal wetland plant species are present in the study area. Under all  
35 alternatives, tidal natural communities restoration would affect one occurrence of woolly rose  
36 mallow and one occurrence of Sanford's arrowhead. The west alignment alternatives (1C, 2C, and  
37 6C) would have the fewest effects on covered and noncovered tidal wetland plants as a result of  
38 constructing the water conveyance facilities. The east alignment alternatives (1B, 2B, and 6B) would  
39 affect the greatest number of occurrences, and Alternative 9 would affect the greatest number of  
40 species, as a result of constructing the water conveyance facilities. The modified pipeline/tunnel  
41 alternative (Alternative 4) would have a level of effects similar to that of the east alignment



1 alternatives and Alternative 9. The pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7, and 8) would  
 2 have slightly fewer effects on nontidal wetland plants than the east alignment alternatives,  
 3 Alternative 4, and Alternative 9.

4 **No Action Alternative**

5 Under the No Action Alternative, there would be no water conveyance facilities construction effects  
 6 on plant species. Also, there would be no benefits and contributions to recovery from the BDCP's  
 7 other conservation measures. As seen in Table 12-7 in Section 12.3.3.1, there are several existing or  
 8 proposed conservation projects under the No Action Alternative that could benefit some of the  
 9 special-status plant species. However, many of these projects and plans are primarily focused on  
 10 providing habitat for wildlife and do not provide the specific conservation and contribution to  
 11 recovery of these plants species within the Delta that the BDCP offers, especially considering that  
 12 conversion of habitat in the Delta as a result of climate change may reduce the distribution of plant  
 13 species in the study area.

14 **Table 12-ES-8. Direct Effects of Alternatives on Vernal Pool Plant Species in the Terrestrial Biological**  
 15 **Resources Study Area (acres and occurrences)<sup>a</sup>**

Alternative <sup>b</sup>	Modeled Vernal Pool Plant Habitat (acres)	Occurrences																
		Alkali milk-vetch	Dwarf downingia	Boggs Lake hedge-hyssop	Legenere	Heckard's pepper-grass	Ferris' milk-vetch	Vernal pool smallscale	Hogwallow starfish	Contra Costa goldfields	Ferris' goldfields	Cotula-leaf navarretia	Baker's navarretia	Colusa grass	Bearded popcorn-flower	Delta woolly-marbles	Saline clover	Solano grass
1A	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1B	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1C	452	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2A	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2B	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2C	452	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
3	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	405	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6A	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6B	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6C	452	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
7	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	372	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<sup>a</sup> Direct effects include both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

16

1 **Table 12-ES-9. Direct Effects of Alternatives on Alkali Seasonal Wetland Plant Species in the Terrestrial Biological Study Area (acres and occurrences)<sup>a</sup>**

Alternative <sup>b</sup>	Modeled Habitat (acres)				Occurrences							
	San Joaquin spearscale	Brittlescale	Heartscale	Delta button-celery <sup>c</sup>	San Joaquin spearscale	Brittlescale	Heartscale	Delta button-celery	Heckard's peppergrass	Crownscale	Palmate-bracted bird's-beak	Recurved larkspur
1A	748	4	306	21	1	0	0	0	1	1	0	0
1B	748	4	306	21	1	0	0	0	1	1	0	0
1C	823	5	307	130	3	0	1	0	1	1	0	1
2A	749	4	306	21	1	0	0	0	1	1	0	0
2B	749	4	306	21	1	0	0	0	1	1	0	0
2C	823	4	307	130	3	0	1	0	1	1	0	1
3	748	4	306	21	1	0	0	0	1	1	0	0
4	761	4	306	95	1	0	0	0	1	2	0	0
5	748	4	306	21	0	0	0	0	1	1	0	0
6A	748	4	306	21	1	0	0	0	1	1	0	0
6B	748	4	306	21	1	0	0	0	1	1	0	0
6C	823	5	307	130	3	0	1	0	1	1	0	1
7	750	4	306	21	1	0	0	0	1	1	0	0
8	748	4	306	21	1	0	0	0	1	1	0	0
9	680	4	306	0	1	0	0	0	1	0	0	0

<sup>a</sup> Direct effects includes both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

<sup>c</sup> Delta button celery habitat includes both alkali seasonal wetlands and valley/foothill riparian. Habitat effects for the species can be found in both Tables 12-ES-8 and 12-ES-10.

Identifies the most and least plant modeled habitat acreage and occurrences affected by the alternatives.

2

1 **Table 12-ES-10. Direct Effects of Alternatives on Grassland Plant Species in the Terrestrial Biological**  
 2 **Study Area (acres and occurrences)<sup>a</sup>**

Alternative <sup>b</sup>	Modeled Habitat (acres)	Occurrences													
	Carquinez goldenbush	Carquinez goldenbush	Big tarplant	Round-leaved filaree	Pappose tarplant	Parry's rough tarplant	Small-flowered morning-glory	Diamond-petaled poppy	Streamside daisy	Stinkbells	Fragrant fritillary	Gairdner's yampah	Keck's checker-mallow	Caper-fruited tropidocarpum	
1A	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
1B	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
1C	4	1	0	0	0	1	0	0	0	0	0	0	1	1	
2A	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
2B	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
2C	4	1	0	0	0	1	0	0	0	0	0	0	1	1	
3	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
4	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
5	4	0	0	0	0	1	0	0	0	0	0	0	0	0	
6A	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
6B	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
6C	4	1	0	0	0	1	0	0	0	0	0	0	1	1	
7	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
8	4	1	0	0	0	1	0	0	0	0	0	0	0	0	
9	4	1	0	0	0	1	0	0	0	0	0	0	0	0	

<sup>a</sup> Direct effects includes both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

3

1 **Table 12-ES-11. Direct Effects of Alternatives on Valley/Foothill Riparian Plant Species in the**  
 2 **Terrestrial Biological Study Area (acres and occurrences)<sup>a</sup>**

Alternative <sup>b</sup>	Modeled Habitat (acres)		Occurrences			
	Delta button-celery <sup>c</sup>	Slough thistle	Delta button-celery	Slough thistle	Northern California black walnut	Wright's trichocoronis
1A	15	11	1	2	0	0
1B	15	11	1	2	0	0
1C	15	11	1	2	0	0
2A	15	11	1	2	0	0
2B	15	11	1	2	0	0
2C	15	11	1	2	0	0
3	15	11	1	2	0	0
4	15	11	1	2	0	0
5	15	11	1	2	0	0
6A	15	11	1	2	0	0
6B	15	11	1	2	0	0
6C	15	11	1	2	0	0
7	30	23	1	2	0	0
8	15	11	1	2	0	0
9	15	11	1	2	0	0

<sup>a</sup> Direct effects includes both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

<sup>c</sup> Delta button celery habitat includes both alkali seasonal wetlands and valley/foothill riparian. Habitat effects for the species can be found in both Tables 12-ES-9 and 12-ES-11.

3

1 Table 12-ES-12. Direct Effects of Alternatives on Tidal Wetland Plant Species in the Terrestrial Biological Study Area (acres and occurrences)<sup>a</sup>

Alternative <sup>b</sup>	Modeled Habitat (acres)					Occurrences							
	Delta mudwort/ Mason's lilaeopsis	Side- flowering skullcap	Soft bird's -beak	Delta tule pea/Suisun Marsh aster	Suisun thistle	Delta mudwort	Delta tule pea	Mason's lilaeopsis	Side- flowering skullcap	Soft bird's- beak	Suisun Marsh aster	Suisun thistle	Bolander's water hemlock
1A	48	10	73	3	73	3	25	23	0	7	27	0	3
1B	53	13	73	5	73	3	28	18	2	7	27	0	3
1C	41	22	73	1	73	3	26	17	0	7	27	0	3
2A	50	7	73	3	73	3	25	23	0	7	27	0	3
2B	58	12	73	5	73	3	28	18	2	7	27	0	3
2C	41	22	73	1	73	3	26	17	0	7	27	0	3
3	41	7	73	3	73	3	25	23	0	7	27	0	3
4	43	13	73	5	73	3	28	22	2	7	29	0	3
5	37	7	73	3	73	3	11	15	0	3	14	0	2
6A	48	10	73	3	73	3	25	23	0	7	27	0	3
6B	53	13	73	5	73	3	28	18	2	7	27	0	3
6C	41	22	73	1	73	3	26	17	0	7	27	0	3
7	45	12	73	4	73	3	25	23	0	7	27	0	3
8	48	10	73	3	73	3	25	23	0	7	27	0	3
9	163	173	73	26	73	10	30	27	2	7	27	0	3

<sup>a</sup> Direct effects includes both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate. corridors (Alternative 9)

Identifies the greatest and least plant modeled habitat acreage and occurrences affected by the alternatives.

1 **Table 12-ES-13. Direct Effects of Alternatives on Inland Dune Plant Species in the Terrestrial Biological**  
 2 **Study Area (occurrences)<sup>a</sup>**

Alternative <sup>b</sup>	Occurrences				
	Hoover's cryptantha	Antioch Dunes wild-buckwheat	Mt. Diablo wild-buckwheat	Contra Costa wallflower	Antioch Dunes evening-primrose
1A	0	0	0	0	0
1B	0	0	0	0	0
1C	0	0	0	0	0
2A	0	0	0	0	0
2B	0	0	0	0	0
2C	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6A	0	0	0	0	0
6B	0	0	0	0	0
6C	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0

<sup>a</sup> Direct effects includes both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

3

1 **Table 12-ES-14. Direct Effects of Alternatives on Nontidal Wetland Plant Species in the Terrestrial**  
 2 **Biological Study Area (occurrences)<sup>a</sup>**

Alternative <sup>b</sup>	Occurrences					
	Watershield	Bristly sedge	Woolly rose-mallow	Eelgrass pondweed	Sanford's arrowhead	Marsh skullcap
1A	1	2	13	0	2	0
1B	0	4	15	0	3	0
1C	0	0	4	1	1	0
2A	1	2	13	0	2	0
2B	0	4	15	0	3	0
2C	0	0	4	1	1	0
3	1	2	12	0	2	0
4	1	2	13	0	3	0
5	1	2	8	0	2	0
6A	1	2	13	0	2	0
6B	0	4	15	0	3	0
6C	0	0	4	1	1	0
7	1	2	13	0	2	0
8	1	2	13	0	2	0
9	0	1	14	1	2	1

<sup>a</sup> Direct effects includes both permanent and temporary.

<sup>b</sup> Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

Identifies the greatest and least plant occurrences affected by the alternatives.

3

## 12.1 Environmental Setting/Affected Environment

This section describes the environmental setting/affected environment for the terrestrial biological resources present in the chapter study area (the area in which impacts may occur). The chapter study area is slightly larger than the BDCP Plan Area because the study area encompasses the Plan Area and two potential transmission corridors outside of the Plan Area referred to as “Areas of Additional Analysis” in the remainder of the chapter (see Figure 12-1). The section presents the natural communities and other land cover types, the special-status and common terrestrial wildlife and plants, and the terrestrial invasive plants found in the study area. A brief discussion of the historical modifications of ecosystem processes and functions of the Plan Area is also included because it is crucial to an understanding of the current status of natural communities and terrestrial plants and wildlife addressed in the BDCP. The common and scientific names of special-status plant and wildlife species mentioned in this chapter and their association with natural communities and other land cover types of the study area are included in Tables 12-2 and 12-3 in Section 12.1.3. The common and scientific names and legal status of all special-status plant and wildlife species with potential to occur in the study area are listed in Appendix 12A, *Special-Status Wildlife and Plant Species Known to Occur or with Potential to Occur in the Study Area*. All common and special-status species mentioned in this chapter are listed in Appendix 12B, *Common and Scientific Names of Terrestrial Species*.

Both the setting and the impact analysis contained in this chapter are focused on the geographic areas proposed for construction of water conveyance facilities and on the areas identified in the BDCP as most likely to support habitat restoration, enhancement and protection. These geographic areas have been characterized as conservation zones (CZs) that encompass the entire Plan Area, and, for tidal marsh and floodplain restoration, as restoration opportunity areas (ROAs) that focus on smaller regions of the Plan Area (see Figure 12-1). CZs were established to focus specific conservation efforts on portions of the Plan Area that have similar landscape characteristics and that represent logical geographic and landform divisions. ROAs were established to identify those locations considered to be the most appropriate for the restoration of tidal habitats and floodplains within the Plan Area and within which restoration goals for tidal and associated upland natural communities would be achieved. The ROAs are large land areas centered on Suisun Marsh, the west and south Delta areas, Cache Slough, and the Cosumnes/ Mokelumne area in the east Delta (see Figure 12-1). These landscape divisions are described in more detail in BDCP Chapter 3, Section 3.2.2, *Identifying Conservation Zones and Restoration Opportunity Areas*. The Areas of Additional Analysis are not included in either the CZs or the ROAs.

### 12.1.1 Historical Trends in Biodiversity of the Plan Area

As described in Chapter 3, *Description of Alternatives*, and shown on Figure 3-1, the Plan Area consists of the statutory Delta, the Suisun Marsh and Yolo Bypass. Historical modifications of ecosystem processes and functions in the Plan Area have had a great influence on the current conditions of natural communities and special-status species. These changes to the ecosystem are discussed in Chapter 11, *Fish and Aquatic Resources*. A brief overview of major historical trends in terrestrial biodiversity is provided below.



1 The abundance of native wildlife and plant species has been reduced over time as a result of the  
 2 extensive historical modifications to and loss of the habitats in the Plan Area. Because of habitat loss,  
 3 large mammal species, such as tule elk, have been extirpated, and small mammal species, such as  
 4 riparian brush rabbit, have been reduced in number and now occur only in scattered locations. The  
 5 remnant marshes are now habitat for several species listed by the California Department of Fish and  
 6 Wildlife (CDFW) as rare, threatened, or endangered, such as the California black rail and Mason's  
 7 lilaepsis. Nevertheless, the Plan Area lies in a central portion of the Pacific Flyway and continues to  
 8 provide vital migratory, wintering, and breeding habitat for migratory birds, especially in  
 9 designated wildlife management areas (e.g., Suisun Marsh and Yolo Bypass), where habitat  
 10 management is optimized for managed species, including waterfowl, shorebirds, and wading birds.  
 11 For example, although waterfowl have been reduced in numbers, the Delta still provides habitat for  
 12 26 species of wintering waterfowl (Bay Institute 1998). The Pacific Flyway is also particularly  
 13 important for shorebirds and neotropical migratory birds.

14 Although fragmented, limited riparian habitat remains in the Plan Area. Remnant patches of tall  
 15 riparian trees, such as Fremont cottonwood, western sycamore, and Goodding's black willow, occur,  
 16 but the reproduction of these species is greatly impaired by lack of active floodplain habitat and  
 17 hydrologic modifications (e.g., straightened and dredged channels, levees separating riparian  
 18 vegetation from channel). The number of species of nesting birds and mammals found in the Plan  
 19 Area that depend on riparian habitat has declined during the last 150 years (Bay Institute 1998).  
 20 Reports from early explorers describe the Delta and adjacent lands as an area with much greater  
 21 wildlife species diversity than is currently found (Bay Institute 1998).

22 Grasslands with vernal pools support high levels of endemic biodiversity in the Central Valley  
 23 (Witham et al. 1998 and references therein). This habitat type occurs in the northeast and  
 24 southwest areas of the Plan Area. The vernal pool landscape in the northeast Plan Area has been  
 25 affected by leveling for agricultural land uses (e.g., Stone Lakes National Wildlife Refuge [NWR]). The  
 26 alkali grassland that supports vernal pools in the southwest Plan Area has been fragmented by  
 27 agricultural and residential development and by water management projects. Only limited habitat  
 28 remains for vernal pool species, such as fairy shrimp and native plants. It is estimated that  
 29 throughout the Central Valley, the acreage of grasslands with vernal pools has declined from 7  
 30 million acres during the 1700's to about 895,000 acres in 2005 (Holland and Hollander 2007;  
 31 Holland 2009). Approximately 135,000 acres were estimated to have been lost from 1976 to 2005.  
 32 (Holland 2009).

33 Most of the land in the Plan Area has been converted to agricultural land uses, which provide limited  
 34 habitat value to most species. However, some species, including Swainson's hawk and greater  
 35 sandhill crane, use the alfalfa and field crop areas for foraging. Besides changing land use,  
 36 agricultural practices can include 1) building levees, which modify hydrology, 2) applying pesticides  
 37 and fertilizers, which alters surface and groundwater quality (see Chapter 6, *Surface Water*) and  
 38 may be toxic to certain species, and 3) other activities that can be detrimental to native plant and  
 39 wildlife habitat.

## 40 **12.1.2 Land Cover Types**

41 The land cover types discussed in this chapter are derived from various sources. Within the Plan  
 42 Area, these cover types are based on the natural communities that are defined and delineated in the  
 43 BDCP for the purposes of the Natural Community Conservation Plan (NCCP) component of the Plan  
 44 (see BDCP Chapter 2, Section 2.3.4). For the two portions of the study area that extend beyond the

1 Plan Area boundary, the natural communities were mapped using a series of mapped datasets,  
 2 reports and aerial imagery prepared by the U.S. Department of Agriculture (USDA), the U.S.  
 3 Geological Survey, CDFW, and other agencies. Natural communities within the study area are  
 4 mapped in Figure 12-1. The description of each natural community below includes a discussion of  
 5 how that natural community functions as habitat for common and special-status terrestrial plants  
 6 and wildlife. Semiaquatic wildlife and plant species and their habitats are also discussed, as  
 7 appropriate. Although there is some overlap in the discussion with Chapter 11, *Fish and Aquatic*  
 8 *Resources*, this section explains how aquatic areas provide habitat for primarily terrestrial plants,  
 9 vernal pool and seasonal wetlands (other than vernal pools) invertebrates, amphibians, reptiles,  
 10 birds, and terrestrial mammals. Also discussed in this section are cultivated lands and developed  
 11 lands, which are not natural communities but which do provide certain types of habitat and are,  
 12 therefore, included with the natural communities.

### 13 **12.1.2.1 Natural Community Mapping Methods**

14 The discussion of natural communities is based, in part, on BDCP Chapter 2, *Existing Ecological*  
 15 *Conditions*. Background data for the BDCP were collected through an extensive search of various  
 16 sources, including current scientific literature (e.g., journal articles, conference proceedings, and  
 17 textbooks), published reports, technical documents, and agency-maintained data (e.g., data  
 18 maintained by the Interagency Ecological Program, CDFW, California Department of Water  
 19 Resources [DWR], and other agencies). Natural communities were generally defined and described  
 20 using the Multi-Species Conservation Strategy (CALFED Bay-Delta Program 2000).

21 The natural communities were delineated in the Delta using the vegetation and land use  
 22 classification developed for the Delta by CDFW (Hickson and Keeler-Wolf 2007). Vegetation in the  
 23 legal Delta, excluding parts of Chipps and Van Sickle islands, was classified and mapped by CDFW  
 24 during 2005–2006 for use in the Delta Regional Ecosystem Restoration Implementation Plan  
 25 (DRERIP). Vegetation was sampled according to the California Native Plant Society (CNPS) Rapid  
 26 Assessment Protocol. The CDFW system follows Sawyer et al. (2009), which is consistent with the  
 27 National Vegetation Classification System for the United States (Grossman et al. 1998).

28 A “crosswalk” table was developed by CDFW between the fine-scale vegetation types classified and  
 29 mapped by CDFW during 2005–2006 and the corresponding broad biological community  
 30 classifications used in the BDCP. Polygons from the fine-scale CDFW map were combined using a  
 31 geographic information system (GIS). The portion of the Plan Area not sampled by CDFW during the  
 32 Delta mapping project was delineated by SAIC ecologists and entered into a GIS using 2005 USDA  
 33 Farm Service Agency National Agriculture Imagery Program (NAIP) color aerial photography with 1-  
 34 meter (3.3-foot) resolution. This imagery was photographically interpreted to identify the natural  
 35 communities present in portions of the Plan Area that were not sampled by CDFW.

36 Natural communities in Suisun Marsh and on Chipps and Van Sickle islands were delineated in 2006  
 37 by Boul and Keeler-Wolf (BDCP Chapter 2, *Existing Ecological Conditions*). Vegetation types in Suisun  
 38 Marsh were primarily determined by wetland management strategies. These strategies were used to  
 39 combine the CDFW Suisun Marsh vegetation types into BDCP natural communities, in combination  
 40 with the San Francisco Estuary Institute’s EcoAtlas GIS dataset. The resulting categorized Suisun  
 41 Marsh vegetation dataset was then compared with NAIP 2005 aerial imagery by ecologists  
 42 preparing the BDCP and refined as necessary. Subsequently, the dataset was merged with the BDCP  
 43 Delta natural community type cover dataset.

1 Instead of using the Yolo County Natural Heritage GIS data to represent crop types in the upper Yolo  
 2 Bypass north of I-80, the DWR land use survey data for Yolo County from 2008 were used to assign  
 3 crop types to the cultivated lands land cover type dataset. The DWR land use dataset was not  
 4 available when the BDCP vegetation dataset was originally created. To maintain consistency when  
 5 and where possible within the crop type classifications, the DWR dataset was used in place of the  
 6 Yolo County data (see BDCP Appendix 2.B, *Vernal Pool Complex Mapping and Modifications to*  
 7 *Natural Community Mapping*).

8 Data from the South Sacramento Habitat Conservation Plan (SSHCP) and modified by ICF biologists  
 9 as necessary following a review of USDA data and Google Earth imagery was used to define  
 10 vegetation cover for the eastern Area of Additional Analysis. Agricultural areas were defined based  
 11 on DWR land cover information. The SSHCP and DWR land cover data were crosswalked to the  
 12 BDCP natural community types.

13 The western Area of Additional Analysis was mapped by ICF biologist and GIS specialists using  
 14 USDA imagery and 2012 Google Earth imagery. The mapped areas were then ground truthed by ICF  
 15 biologists in May 2012 to verify the accuracy of the GIS mapping and to further refine the  
 16 agricultural classifications.

17 In addition, a separate dataset was generated to describe vernal pool characteristics present in the  
 18 Plan Area. Vernal pool complexes were identified and mapped with the help of aerial photographs;  
 19 existing vernal pool GIS data sets; California Natural Diversity Database (CNDDDB) records of vernal  
 20 pool species; and topographic data, using Light Detection and Ranging (LiDAR). See BDCP Chapter 2,  
 21 *Existing Ecological Conditions*, for a detailed methods description.

22 A mapping effort independent of natural communities mapping was conducted for wetlands and  
 23 open water that are regulated as jurisdictional wetlands by Section 404 of the Clean Water Act. This  
 24 mapping effort was designed to aid in future permitting processes for BDCP planned actions,  
 25 specifically construction of the water conveyance facilities. The mapping methodology and wetlands  
 26 nomenclature is distinctly different from that used in the natural communities analysis for the BDCP  
 27 and this document. The methods used to conduct this mapping are described in Section 12.3.2.4. The  
 28 results of this mapping and the relationship between BDCP implementation and these jurisdictional  
 29 wetlands is described in detail in the General Terrestrial Biological Effects sections of each  
 30 alternative analysis later in this chapter (see Section 12.3.3, *Effects and Mitigation Approaches*).

### 31 **12.1.2.2 Special-Status and Other Natural Communities**

32 Twelve of the natural community types occurring in the study area are, for the purposes of this  
 33 EIR/EIS, identified as special-status natural communities. These communities are considered special  
 34 status because they include specific vegetation alliances that are recognized by CDFW as of limited  
 35 distribution statewide or within a county or region (CNDDDB Rank of S1–S3), or because they require  
 36 focused analysis under these federal and state laws and regulations:

- 37 ● California Environmental Quality Act (CEQA).
- 38 ● Section 1602 of the California Fish and Game Code.
- 39 ● Section 404 of the Clean Water Act (CWA).
- 40 ● California's Porter-Cologne Water Quality Control Act (Porter-Cologne Act).

1 These laws and regulations are discussed in Section 12.2, *Regulatory Setting*. Special-status natural  
 2 communities may be of special concern to resource agencies and conservation organizations for a  
 3 variety of reasons, including their locally or regionally declining status or because they provide  
 4 important habitat to common and special-status species. Many of these habitats are monitored and  
 5 reported in the CNDDDB, which is maintained by CDFW. The following natural communities, all of  
 6 which are found within the study area, are considered special-status natural communities.

- 7 • Tidal Perennial Aquatic
- 8 • Tidal Mudflat
- 9 • Tidal Brackish Emergent Wetland
- 10 • Tidal Freshwater Emergent Wetland
- 11 • Valley/Foothill Riparian
- 12 • Nontidal Perennial Aquatic
- 13 • Nontidal Freshwater Perennial Emergent Wetland
- 14 • Alkali Seasonal Wetland Complex
- 15 • Vernal Pool Complex
- 16 • Managed Wetland
- 17 • Other Natural Seasonal Wetland
- 18 • Inland Dune Scrub

19 Of these twelve natural communities, all but the inland dune scrub have elements of aquatic habitat  
 20 or potential aquatic habitat (valley/foothill riparian) protected under the CWA and Porter-Cologne  
 21 Act. To simplify the permitting processes, the regulated habitat types have been grouped into the  
 22 following open water and wetland categories:

- 23 • Open Water
  - 24 ○ Nontidal Flow
  - 25 ○ Muted Tidal Flow
  - 26 ○ Tidal Flow
  - 27 ○ Pond or Lake (nontidal)
- 28 • Wetland
  - 29 ○ Nontidal Wetland
  - 30 ○ Tidal Wetland
  - 31 ○ Seasonal Wetland

32 Impacts on waters of the United States discussed later in this document (Section 12.3.3) are  
 33 presented in the open water and wetland categories listed above. These groupings ensure that  
 34 impacts are assessed, and mitigation assigned, by proper hydrologic regime (tidal versus nontidal,  
 35 perennial versus seasonal), which is typically required by regulatory agencies. During the regulatory  
 36 processes, the habitats will be further detailed by type of wetland feature, based on vegetation (e.g.,  
 37 herbaceous versus woody).

1 One other natural community (grassland) and two land cover types (cultivated lands and developed  
 2 lands) also are present in the study area but are not considered special-status natural communities.  
 3 Though some grasslands, cultivated lands, and developed lands provide habitat for special-status  
 4 species, as a natural community and a land cover type these areas are not of limited distribution and  
 5 do not in themselves require particular regulatory consideration for the vegetation that occurs there  
 6 (e.g., these areas are not regulated wetlands). Throughout the remainder of the chapter, these three  
 7 community/land cover types are addressed in the context of the other natural communities. The  
 8 cultivated lands land cover type is treated as a natural community in the BDCP to meet the  
 9 requirements of the Natural Communities Conservation and Protection Act (NCCPA) and to  
 10 recognize its value to covered species addressed in the Plan. Tidal mudflat, which is listed above, is  
 11 not mapped separately, and occurs at the edges between tidal perennial aquatic, tidal freshwater  
 12 emergent, and tidal brackish emergent wetland. Therefore, the tidal mudflat natural community is  
 13 not addressed separately in detail in this chapter.

14 The study area natural communities are described below, including how each is used by common  
 15 and special-status plant and wildlife species. Information on natural communities and associated  
 16 plant and wildlife species was summarized from BDCP Chapter 2, Section 2.3.4, *Natural*  
 17 *Communities*. Table 12-2 and Table 12-3 list the special-status species (covered and noncovered  
 18 species) supported by these natural communities. The acreages of each natural community within  
 19 the Plan Area and this chapter's study area are presented in Table 12-1.

20 **Table 12-1. Area (in acres) of Natural Community Types in the Terrestrial Biology Study Area**

Natural Community Type	Plan Area	Areas of Additional Analysis	Study Area Total	Percentage of the Study Area
Tidal Perennial Aquatic	86,263	0	86,263	10
Tidal Brackish Emergent Wetland	8,501	0	8,501	<1
Tidal Freshwater Emergent Wetland	8,856	0	8,856	1
Valley/Foothill Riparian	17,644	322	17,966	2
Nontidal Perennial Aquatic	5,489	78	5,567	<1
Nontidal Freshwater Perennial Emergent Wetland	1,385	124	1,509	<1
Alkali Seasonal Wetland Complex	3,723	0	3,723	<1
Vernal Pool Complex	11,284	849	12,133	1
Managed Wetland	70,698	100	70,798	8
Other Natural Seasonal Wetland	276	566	842	<1
Grassland	76,315	1,732	78,047	9
Inland Dune Scrub	19	0	19	<1
Cultivated Lands	481,909	5,197	487,106	56
Developed	90,278	382	90,660	10
<b>Total</b>	<b>862,640</b>	<b>9,350</b>	<b>871,990</b>	<b>100.0</b>

21  
 22 **Tidal Perennial Aquatic**

23 The tidal perennial aquatic natural community is defined as deep-water aquatic (greater than 10  
 24 feet deep from mean lower low tide [i.e., 19-year average of the lowest of the two low tides during  
 25 the daily tidal cycle]) and shallow aquatic (less than or equal to 10 feet deep from mean lower low  
 26 tide) zones of estuarine bays, river channels, and sloughs. Under present operations, tidal perennial

1 aquatic in the Delta is mainly freshwater habitat, with brackish and saline conditions occurring in  
2 the western Delta (CZs 5 and 10) at times of high tides and low flows into the western Delta. It is  
3 freshwater in the Yolo Bypass (CZ 2) and mainly brackish and saline in Suisun Marsh (CZ 11).

4 Eight plant community alliances (i.e., unique species assemblages) mapped in the Plan Area occur  
5 within the tidal perennial aquatic natural community (Hickson and Keeler-Wolf 2007). (A  
6 comparison table “crosswalk” for the alliances that make up the tidal perennial aquatic community  
7 can be found in BDCP Chapter 2, Section 2.3.4, *Natural Communities*.) Aquatic vegetation in the study  
8 area can be separated into two general categories: floating aquatic vegetation and submerged  
9 aquatic vegetation (Cowardin et al. 1979). The geographic extent of this vegetation changes  
10 frequently because it depends on highly variable physical factors, such as depth, turbidity, water  
11 flow, salinity, substrate, and nutrient availability.

12 Floating aquatic vegetation extends over the open water surface, either as free-floating plants or as  
13 colonies extending from plants rooted in banks. Most floating aquatic vegetation in the Delta  
14 consists of highly invasive nonnative plants such as water hyacinth, which commonly occurs in  
15 dense floating mats thick enough to create anoxic conditions in ditches and canals.

16 Floating aquatic vegetation also occurs in sloughs, especially near their source of origin where flows  
17 are slow. Abundant floating aquatic vegetation frequently presents a nuisance to boaters. Even  
18 native floating aquatic species may become overabundant and invasive in nutrient-rich waters of  
19 urban and agricultural watersheds with diminished tidal and freshwater outflows. Floating aquatic  
20 vegetation borders marshes along large sloughs and small tidal channels in the Delta and may  
21 accumulate in such large quantities that it may affect marsh vegetation by smothering it with  
22 decomposing masses of debris.

23 Submerged aquatic plants have leaves and stems that are fully submerged for all or nearly all of  
24 their life-cycle, and they often have root systems reduced to minimal anchorage structures in pond  
25 or river beds. Many native submerged aquatic species, including pondweeds (e.g., sago pondweed)  
26 and stoneworts (green algae structurally similar to vascular plants), are highly valuable food plants  
27 for waterfowl and nursery habitat for aquatic invertebrates and fish. Submerged aquatic vegetation  
28 may form patches or beds of extensive bottom “canopy” habitat. In the Delta, nonnative invasive  
29 submerged aquatic species dominate and replace native species in naturally open water slough  
30 beds. Brazilian waterweed, also known as *Egeria*, is invasive and extremely competitive with native  
31 species, and it is capable of surviving at great water depths. It has structural characteristics that  
32 create suitable cover and shelter for predatory nonnative fish in tidal slough beds. Restoration of  
33 shallow or deep subtidal habitats in the Delta may be viewed unfavorably because of Brazilian  
34 waterweed, which is rapidly established in these habitats.

35 Aquatic plant communities that are dominated by native species would be considered special-status  
36 communities because they provide suitable habitat for special-status plants and animals. These  
37 communities would, in most cases, be considered jurisdictional waters of the United States and  
38 regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA. They would  
39 also be regulated by a California Regional Water Quality Control Board as waters of the state under  
40 the Porter-Cologne Act.

41 Wildlife species associated with tidal aquatic habitats vary with water depth and other habitat  
42 features. Deeper open water areas without vegetation provide foraging habitat for wildlife such as  
43 terns, gulls, osprey, diving ducks, such as ring-necked duck and canvasback, and river otters, which  
44 feed primarily on fish, crayfish, and other aquatic organisms. Shallower water with submerged or

1 floating aquatic vegetation provides foraging habitat for reptiles, such as western pond turtle, and  
 2 dabbling ducks, such as American widgeon and Northern pintail, which feed on a variety of  
 3 invertebrates and plant material. Tables 12-2 and 12-3 list special-status plant and wildlife species  
 4 supported by the tidal perennial aquatic natural community. The community's distribution in the  
 5 study area is mapped in Figure 12-1.

### 6 **Tidal Mudflat**

7 The tidal mudflat natural community typically occurs as sediments in the intertidal zone between  
 8 the mean high tide and the mean lower low tide. This natural community is exposed above water at  
 9 low tide and is typically associated with tidal freshwater emergent wetland or tidal brackish  
 10 emergent wetland at its upper edge. Because tidal mudflat has been mapped as part of the tidal  
 11 perennial aquatic, tidal brackish emergent wetland and tidal freshwater emergent wetland  
 12 communities, it is not shown on Figure 12-1 or listed in Tables 12-1, 12-2, or 12-3. Tidal mudflat can  
 13 be found throughout the study area but differs slightly in nature in the Suisun Marsh (CZ 11) and in  
 14 the Delta because physical factors, such as rates of sediment erosion and deposition and duration of  
 15 tidal inundation, vary. Tidal mudflat is a special-status natural community because activities within  
 16 this community would be regulated as wetlands by Section 404 of the CWA and waters of the state  
 17 under the Porter-Cologne Act.

18 Tidal mudflat is important habitat for two of the covered plant species: Mason's lilaepsis and Delta  
 19 mudwort (Fiedler and Zebell 1993; Witham and Kareofelas 1994). Suisun marsh aster, another  
 20 covered species, is also found on tidal mudflats in the Delta. A great abundance and diversity of  
 21 invertebrates are found at varying depths in the substrate, and they support a variety of foraging  
 22 shorebirds, wading birds, and dabbling ducks, such as western sandpiper, dunlin, long- and short-  
 23 billed dowitchers, whimbrel, long-billed curlew, great egret, black-crowned night-heron, cinnamon  
 24 and green-winged teal, and mallard. As the tide rises and mudflats are inundated with deeper water,  
 25 wildlife species composition shifts to species described above for submerged aquatic vegetation.

### 26 **Tidal Brackish Emergent Wetland**

27 The tidal brackish emergent wetland natural community is a transitional community between tidal  
 28 perennial aquatic and terrestrial upland communities. In the study area, tidal brackish emergent  
 29 wetland exists in the San Francisco Bay saltwater/Delta freshwater mixing zone that extends from  
 30 near Collinsville (CZs 5, 10, and 11) westward to the Carquinez Strait. Tidal brackish emergent  
 31 wetland is present on the south side of Suisun Bay and on islands in midchannel but is most  
 32 extensive in Suisun Marsh (CZ 11). The distribution of tidal brackish emergent wetland in the study  
 33 area is shown on Figure 12-1.

34 The tidal brackish emergent wetland community in the study area is found in undiked areas of  
 35 Suisun Marsh, such as Rush Ranch and Hill Slough; along undiked shorelines on the south shore of  
 36 Suisun Bay; and on undiked in-channel islands, such as Browns Island. Eight plant community  
 37 alliances mapped in the Plan Area fall within the tidal brackish emergent wetland natural  
 38 community (Hickson and Keeler-Wolf 2007; Keeler-Wolf and Vaghti 2000).

39 Tidal brackish emergent wetland in the study area is characterized by tall herbaceous wetland plant  
 40 species that line the channels down to the depth of mean lower low tide. Dominant plant species  
 41 include hard-stem bulrush, California bulrush, common reed, and cattail (Suisun Ecological  
 42 Workgroup 1997; Grewell et al. 2007). Dominant species present between the channels and the  
 43 marsh plain include pickleweed, saltgrass, saltmarsh dodder, spearscale, and Baltic rush. Tidal

1 brackish emergent wetland in the Suisun Marsh area is habitat for several special-status plant  
 2 species: soft bird's-beak and Suisun thistle, both federally listed as endangered, and Suisun Marsh  
 3 aster, San Joaquin spearscale, and Bolander's water-hemlock. Channels in tidal brackish emergent  
 4 wetland may be flooded or exposed, depending on tidal stage. The marsh plain is usually free of  
 5 standing water but may be flooded at very high tides. Wildlife use of channels is similar to that of  
 6 tidal mudflats and in some cases tidal perennial aquatic, especially in larger channels. On the marsh  
 7 plain and in channels with vegetative cover, typical wildlife present include ornate shrew, song  
 8 sparrow, and red-winged blackbird. Tables 12-2 and 12-3 list special-status plant and wildlife  
 9 species supported by the tidal brackish emergent wetland natural community. The community's  
 10 distribution is mapped in Figure 12-1. Tidal brackish emergent wetland is a special-status natural  
 11 community because activities within this community would be regulated as wetlands by Section 404  
 12 of the CWA and as waters of the state under the Porter-Cologne Act.

### 13 **Tidal Freshwater Emergent Wetland**

14 The tidal freshwater emergent wetland natural community is typically a transitional community  
 15 between tidal perennial aquatic and valley/foothill riparian or terrestrial upland communities  
 16 across a range of hydrologic and soil conditions. In the study area, the tidal freshwater emergent  
 17 wetland community often occurs at the shallow, slow-moving or stagnant edges of freshwater  
 18 waterways or ponds in the intertidal zone and is subject to frequent long-duration flooding. The  
 19 distribution of tidal freshwater emergent wetland in the study area is shown on Figure 12-1.

20 Tidal freshwater emergent wetland vegetation naturally occurs along a hydrologic gradient in the  
 21 transition zone between open water and riparian vegetation or upland terrestrial vegetation such as  
 22 grasslands or woodlands. In the study area, there are abrupt transitions to agricultural cover,  
 23 managed wetlands, and boundaries formed by levees and other artificial landforms. Seventeen plant  
 24 community alliances mapped in the Plan Area fall within the tidal freshwater emergent wetland  
 25 natural community (Hickson and Keeler-Wolf 2007).

26 Tidal freshwater emergent wetland is regularly and occasionally flooded tidal marshlands with very  
 27 low levels of soil salinity. These communities can be categorized based on their frequency of  
 28 inundation. The low elevation tidal freshwater emergent wetland is influenced by the daily tides and  
 29 is flooded more times than not. Middle-elevation tidal freshwater emergent wetland is regularly  
 30 flooded, but the soil is exposed above the water level for many hours each day. High-elevation tidal  
 31 freshwater emergent wetland is occasionally flooded by tides or flood events but includes  
 32 depressions that remain flooded after tides recede.

33 Low-elevation tidal freshwater emergent wetland typically is dominated by tules and occasionally  
 34 includes species of cattails. They are highly productive but support few species other than tules that  
 35 tolerate deep, prolonged tidal flooding. The middle-elevation tidal freshwater emergent wetland is  
 36 more diverse in plant species (e.g., bur-reed, broadleaf arrowhead, and water smartweed), even  
 37 though this community may also be dominated by tules.

38 Middle-elevation tidal freshwater emergent wetland is less abundant than low-elevation tidal  
 39 freshwater emergent wetland and often represents a more mature marsh condition with long  
 40 periods of peat accumulation or sediment deposition. Much of this plant community has been  
 41 converted to other land uses, such as agriculture. Invasive nonnative plants, such as yellow flag iris  
 42 and purple loosestrife, tend to invade this species-rich freshwater zone. The middle-elevation tidal  
 43 freshwater emergent wetland zone grades into the uppermost end of tidal freshwater marsh (high-



1 elevation intertidal marsh zone). This high-elevation type of tidal freshwater marsh is also rare but  
2 is well developed in a few locations in the Delta.

3 The high-elevation tidal freshwater emergent wetland zone can be dominated by grass and grasslike  
4 species, such as Baltic rush, creeping wildrye, and saltgrass. It typically includes large patches of  
5 yerba mansa and wild heliotrope. Special-status plant species commonly found in this plant  
6 community include Suisun marsh aster and woolly rose-mallow. Large thickets of nonnative  
7 Himalayan blackberry invade high-elevation tidal freshwater emergent wetland, converting the  
8 marsh to riparian scrub thickets. High-elevation tidal freshwater emergent wetland may naturally  
9 grade into low-elevation grasslands (dense stands of saltgrass and creeping wildrye) or seasonal  
10 wetland transition zones, or it may end abruptly at the edges of steep levees or eroded riverbanks.

11 Wildlife species composition in sparsely vegetated areas in low-elevation tidal freshwater emergent  
12 wetland is similar to the composition described above under tidal perennial aquatic and tidal  
13 mudflat. Other wildlife that use these productive wetlands as foraging habitat and the dense  
14 vegetation as cover, especially in the low- and middle-elevations, include western pond turtle,  
15 wading birds (egrets and herons), waterfowl (ducks, geese, and swans), shorebirds (e.g., rails,  
16 plovers, sandpipers), and perching birds. Common nesting birds include red-winged blackbird,  
17 marsh wren, common yellowthroat, and black-crowned night-heron. American beaver and muskrat  
18 forage on marsh plants and use them for cover and den material. Tables 12-2 and 12-3 list the  
19 special-status plant and wildlife species supported by the tidal freshwater emergent wetland natural  
20 community.

21 Most wetlands in this category would qualify as wetlands subject to USACE jurisdiction under  
22 Section 404 of the CWA. All tidal freshwater emergent wetland would be considered waters of the  
23 state and be regulated under the Porter-Cologne Act. If located adjacent to a stream or lake, it would  
24 also be subject to regulation under Section 1602 of the California Fish and Game Code.

### 25 **Valley/Foothill Riparian**

26 Broadly defined, the valley/foothill riparian natural community is often a transition zone between  
27 aquatic and upland terrestrial habitat and is found in a wide range of geologic, soil, and other  
28 environmental conditions (e.g., variable light and nutrient availability) throughout the study area  
29 (Bay Institute 1998; Vaghti and Greco 2007). The current extent of the valley/foothill riparian  
30 community represents a small proportion of its historical extent in the study area. Historically,  
31 valley/foothill riparian vegetation was distributed along all major and minor waterways and  
32 floodplains throughout the study area (Bay Institute 1998). The loss of riparian vegetation  
33 throughout California, estimated to be 85%–95%, was caused by human activities, such as river and  
34 stream channelization, levee building, vegetation removal to stabilize levees, and extensive  
35 agricultural and urban development (Riparian Habitat Joint Venture 2004).

36 Valley/foothill riparian communities occur in the study area most often as long, linear patches  
37 separating other terrestrial biological communities and agricultural or urban land, or in low-lying,  
38 flood-prone patches near river bends, canals, or breached levees (Figure 12-1). An exception is in  
39 conservation areas where large tracts of riparian forest are being restored, such as the Cosumnes  
40 River Preserve. Generally, however, this natural community is located along many of the major and  
41 minor waterways, oxbows, and levees in the study area, including the Sacramento River (CZs 3, 4,  
42 and 5), the Sacramento River Deep Water Ship Channel (CZs 2 and 3), the Yolo Bypass (CZ 2), and  
43 channels of the San Joaquin River and the Delta (CZs 5, 6, and 7). Patches of riparian vegetation are

1 also found on the interior of leveed Delta islands, along drainage channels and pond margins, and in  
2 abandoned, low-lying fields.

3 CDFW identified 41 plant community alliances in the Delta that fall within the valley/foothill  
4 riparian natural community (Hickson and Keeler-Wolf 2007). These assemblages are discussed  
5 below in general terms under the riparian scrub, and riparian forest and woodland subcategories.  
6 Tables 12-2 and 12-3 list the special-status plant and wildlife species supported by the  
7 valley/foothill riparian natural community. The community is mapped in Figure 12-1.

### 8 ***Riparian Scrub***

9 Riparian scrub in the study area consists of woody riparian shrubs forming dense thickets. Species  
10 may include willows, blackberries, buttonbush, mulefat, and other shrub species. These thickets are  
11 usually associated with higher, sloping, better-drained edges of marshes, or topographic high areas,  
12 such as levee remnants and elevated flood deposits. Thickets may occur along shorelines of ponds or  
13 banks of channels in tidal or nontidal freshwater habitats. Willow thickets and dead branches or  
14 trees (snags) in riparian woodland provide important habitat for a wide range of wildlife species.  
15 During extreme floods, dense and tall riparian willow thicket canopies may remain partially above  
16 water levels, trap debris and sediment, and act as permeable barriers to wave energy traveling  
17 across open water. Nonnative Himalayan blackberry thickets are a common element of riparian  
18 scrub communities along levees and throughout pastures within the levees.

19 Riparian scrub is considered a special-status natural community because this community supports a  
20 range of sensitive species, has overall importance to biodiversity, and is subject to CDFW regulation  
21 under Section 1602 of the California Fish and Game Code and Fish and Game Code Section 3503  
22 when nesting bird species are present. Riparian scrub located in areas subject to frequent flooding  
23 or ponding also may qualify as wetlands subject to USACE jurisdiction under Section 404 of the  
24 CWA, and waters of the state under the Porter-Cologne Act.

### 25 ***Riparian Forest and Woodland***

26 The study area supports winter-deciduous, broadleaved trees, up to 60 feet in height in the riparian  
27 forest and woodlands, where the canopy cover ranges from relatively open to very dense. At  
28 present, riparian forest and woodland communities dominated by tree species are mostly limited to  
29 narrow bands along sloughs, channels, rivers, and other freshwater features throughout the study  
30 area. Cottonwoods and willow mixed with Oregon ash, box elder, and California sycamore are the  
31 most common riparian trees in central California. Valley oak is common in riparian areas in the  
32 Central Valley, as are species of walnut. Riparian woodland often has a shrubby understory  
33 consisting of the similar species discussed above in riparian scrub. Equivalent communities, as  
34 described by Holland (1986), include great valley cottonwood riparian forest, great valley mixed  
35 riparian forest, great valley oak riparian forest, and white alder riparian forest.

36 Riparian forest and woodland are considered sensitive natural communities because they are  
37 subject to CDFW regulations under California Fish and Game Code Section 1602 and Fish and Game  
38 Code Section 3503 when nesting bird species are present. Riparian forest and woodlands are also  
39 considered sensitive communities because they have sustained considerable losses throughout the  
40 state. Riparian habitat supports a wide variety of wildlife species. Riparian trees are used for  
41 nesting, foraging, and protective cover by many bird species, including black-headed grosbeak, tree  
42 swallow, Bewick's wren, and Cooper's hawk. Riparian canopies provide nesting and foraging habitat  
43 for common mammals, such as western gray squirrel. Understory shrubs provide cover for

1 mammals such as desert cottontail and for ground-nesting birds, such as spotted towhee, that forage  
2 among the vegetation and leaf litter. Mammals such as raccoon and opossum benefit from the  
3 variety of berries, invertebrates, small mammals, and bird eggs that provide food.

#### 4 **Nontidal Perennial Aquatic**

5 Nontidal perennial aquatic natural communities in the Delta can range in size from small ponds in  
6 uplands to large lakes, such as North and South Stone Lakes (CZ 4). The nontidal perennial aquatic  
7 natural community can be found in association with any terrestrial habitat and can transition into  
8 nontidal freshwater perennial emergent wetland and valley/foothill riparian. This natural  
9 community is differentiated from the tidal perennial aquatic natural community described above by  
10 a physical separation from the tidally influenced sloughs and channels in the Delta.

11 Dominant plant species present in the nontidal perennial aquatic natural community include most of  
12 the species mentioned above for the tidal perennial aquatic natural community, including floating  
13 water primrose, water hyacinth, and Brazilian waterweed. Vegetation in nontidal perennial aquatic  
14 can be similarly characterized as floating aquatic vegetation and submerged aquatic vegetation (see  
15 description above).

16 Nontidal perennial aquatic communities provide foraging habitat and winter roosting habitat for  
17 wildlife that depends on other habitats for breeding and cover. Typical species include pied-billed  
18 grebe, western grebe, ruddy duck, canvasback, bufflehead, and river otter. Tables 12-2 and 12-3 list  
19 special-status plant and wildlife species supported by the nontidal perennial aquatic natural  
20 community. The community is mapped in Figure 12-1. The nontidal perennial aquatic community is  
21 a special-status natural community because activities within this community would be regulated as  
22 wetlands by Section 404 of the CWA and waters of the state under the Porter-Cologne Act. When this  
23 community is associated with a lake or stream, it may also be regulated under Section 1602 of the  
24 California Fish and Game Code.

#### 25 **Nontidal Freshwater Perennial Emergent Wetland**

26 The nontidal freshwater perennial emergent wetland community is composed of permanently  
27 saturated wetlands, including meadows, dominated by emergent plant species that do not tolerate  
28 permanent saline or brackish conditions (CALFED Bay-Delta Program 2000). Nontidal freshwater  
29 perennial emergent wetland communities in the study area occur in small fragments along the edges  
30 of the nontidal perennial aquatic and valley/foothill riparian natural communities (Figure 12-1).  
31 These emergent wetlands typically occur on the land side of the Delta levees. Shallow emergent  
32 wetlands (water less than 3 feet deep) are dominated by thick, tall, highly productive stands of tules  
33 and cattails.

34 Many of the nontidal freshwater perennial emergent wetland that occurs in the study area is  
35 disturbed, either through hydrologic disturbance or by physical disturbances. Broad, deeply flooded  
36 areas that are covered by open water most of the year and that develop emergent mud beds late in  
37 the growing season effectively alternate between seasonal ponds and freshwater marshes. Physical  
38 disturbance are direct, such as channel dredging, or indirect as a result of adjacent agricultural,  
39 commercial, or residential activities. Disturbed nontidal freshwater perennial emergent wetland  
40 that occurs in ditches supports a higher proportion of cattails than undisturbed nontidal freshwater  
41 marshes. Characteristic forbs and grasslike species associated with nontidal freshwater perennial  
42 emergent wetland include a mix of native and nonnative species, such as cocklebur, curly dock,  
43 several knotweed species, common spikerush, rabbit-foot grass, and dallisgrass. The higher

1 elevation edges of freshwater marsh gradients may be characterized by abrupt transitions to  
 2 terrestrial vegetation, or they may transition into vegetation of alkali seasonal wetlands, riparian  
 3 woodland, or riparian scrub.

4 Nontidal freshwater perennial emergent wetland provides important foraging, breeding, and winter  
 5 roosting habitat for a variety of wildlife species; dense emergent vegetation provides concealment  
 6 from predators. Reptiles and amphibians associated with marsh habitats include common garter  
 7 snake, Pacific chorus frog, and bullfrog. Locally common to abundant wading birds (egrets and  
 8 herons), waterfowl (ducks, geese, and swans), shorebirds (e.g., rails, plovers, sandpipers), and  
 9 perching birds (e.g., red-winged blackbird, marsh wren, common yellowthroat) use nontidal marsh  
 10 habitat for foraging, cover, and nesting. American beavers and muskrats forage on marsh plants and  
 11 use them for cover and den material. River otter forage on fish, amphibians, and invertebrates as  
 12 well as use the cover provided by thickets and tall wetland plants. Tables 12-2 and 12-3 list special-  
 13 status plant and wildlife species supported by the nontidal freshwater perennial emergent wetland  
 14 natural community. The nontidal freshwater perennial emergent wetland community is a special-  
 15 status natural community because activities within this community would be regulated as wetlands  
 16 by Section 404 of the CWA and waters of the state under the Porter-Cologne Act. When this  
 17 community is associated with a lake or stream, it may also be regulated under Section 1602 of the  
 18 California Fish and Game Code.

#### 19 **Alkali Seasonal Wetland Complex**

20 Alkali seasonal wetland complex occurs on alkaline soils with ponded or saturated soil conditions  
 21 for prolonged periods during the growing season. The vegetation of alkaline seasonal wetlands is  
 22 composed of salt-tolerant plant species adapted to wetland conditions and high salinity levels. This  
 23 natural community “complex” includes both seasonally ponded and saturated wetlands and the  
 24 surrounding matrix of grassland. It is typically found either at the historical locations of lakes or  
 25 ponds in the Yolo Basin (CZ 2) in and around the CDFW Tule Ranch Preserve (Witham 2003) where  
 26 salts accumulated through evaporation, or in upland locations, such as basin rims and seasonal  
 27 drainages, that receive salts in runoff from distant upslope salt-bearing rock. Areas near Suisun  
 28 Marsh (CZ 11) and the Clifton Court Forebay (CZ 8) are examples of the latter locations (Figure  
 29 12-1).

30 The composition of alkali seasonal wetland complex can be highly variable from site to site, and  
 31 these wetlands may include species typically associated with the Holland communities of alkali  
 32 grassland, alkali sink, chenopod scrub, brackish marsh, valley sink scrub, and alkaline vernal pools  
 33 (Holland 1986). Alkaline seasonal wetlands can support a richness of species, and they often provide  
 34 suitable habitat for a number of special-status plant species. Dominant grasses in alkaline seasonal  
 35 wetlands and surrounding grassland include saltgrass and wild barley. The associated herb cover  
 36 consists of salt-tolerant species, including saltbush, alkali heath, alkali weed, alkali mallow, and  
 37 common spikeweed. The study area includes small stands of alkali sink scrub (also known as valley  
 38 sink scrub), which are characterized by iodine bush. Alkali seasonal wetland complex is rare in the  
 39 study area, occurring primarily around Clifton Court Forebay, southeastern Solano County, and in  
 40 the Yolo Bypass.

41 Alkali seasonal wetland complex is considered a special-status community because it provides  
 42 suitable habitat for many special-status plants and animals, and in many cases is considered  
 43 jurisdictional wetlands regulated by USACE under Section 404 of the CWA, and waters of the state  
 44 under the Porter-Cologne Act.

1 During winter and spring, when alkali seasonal wetlands are filled with water, plants, and aquatic  
2 life, the wetlands act as an important foraging habitat for a variety of common wildlife species,  
3 including great blue heron and great egret. Alkali seasonal wetlands support common wildlife  
4 species, including dabbling ducks, invertebrates such as various native bee species, and reptiles and  
5 amphibians, such as the common garter snake and Pacific chorus frog. Tables 12-2 and 12-3 list  
6 special-status plant and wildlife species supported by the alkali seasonal wetland complex natural  
7 community.

## 8 **Vernal Pool Complex**

9 The vernal pool complex natural community is characterized by interconnected and isolated groups  
10 of vernal pool wetlands and seasonal swales in the matrix of the grassland natural community  
11 (described below). The vernal pool complex community is rare in the study area and is generally  
12 contiguous with vernal pool habitat adjacent to the study area (Figure 12-1). It was mapped  
13 specifically for the BDCP using a range of methods because there were no available data sets with  
14 the appropriate level of detail or spatial extent. Details of the methods used to map the Vernal Pool  
15 Complex community are presented above in the introduction to Section 12.1.2.1, *Natural Community*  
16 *Mapping Methods*. In the study area, vernal pool grassland occurs in the vicinity of Stone Lakes NWR  
17 (CZ 4), Yolo Bypass (CZ 2), southeastern Solano County (CZ 1), Jepson Prairie, and Clifton Court  
18 Forebay (CZ 8).

19 Vernal pools are seasonal wetlands that form in shallow depressions underlain by hardpan or a  
20 dense clay subsurface layer. These depressions fill with rainwater and surface runoff; the subsurface  
21 layers restrict infiltration into the subsoil and the depressions remain inundated throughout the  
22 winter, and sometimes as late as early summer. Vernal pools are found in areas of level or gently  
23 undulating topography in the lowlands of California, especially in the grasslands of the Central  
24 Valley. Although these wetlands are typically small, some vernal pools can reach several acres in  
25 size. Rising spring temperatures cause the water in vernal pools to evaporate, promoting the growth  
26 of concentric bands of various plant species, especially native wildflowers, along the shrinking edge  
27 of the pool. Vernal pool vegetation in California is characterized by a high percentage of native  
28 species, several of which have restricted ranges. Many plant species, and a number of animal species  
29 associated with vernal pools, are federally or state listed as rare, threatened, or endangered.

30 Vernal pools and vernal pool grassland are considered special-status natural communities because  
31 they provide vital habitat for many special-status plants and animals. They are of concern to CDFW,  
32 and when they meet specific criteria established by USACE, they are considered jurisdictional  
33 wetlands under Section 404 of the CWA. The vernal pools could also be considered waters of the  
34 state under the Porter-Cologne Act.

35 During winter and spring, when vernal pools or seasonal wetlands are filled with water, plants, and  
36 aquatic life, they act as an important foraging habitat for a variety of common wildlife species,  
37 including great blue heron and great egret. Vernal pools and seasonal wetlands support common  
38 wildlife species, including dabbling ducks, invertebrates such as various native bee species, and  
39 reptiles and amphibians, such as the common garter snake and Pacific chorus frog. The uplands that  
40 surround vernal pools also provide habitat for pollinators of native vernal pool plants (e.g., solitary  
41 bees) as well as refugia for amphibian species that utilize these pools for breeding. Tables 12-2 and  
42 12-3 list special-status plant and wildlife species supported by the vernal pool complex natural  
43 community.

1 Degraded vernal pools has been characterized as a subset of the vernal pool complex natural  
 2 community for purposes of this EIR/EIS. This designation applies to those areas where vernal pool  
 3 terrain was historically present but where the original topography has been disturbed by grading  
 4 activities. These areas retain their seasonal hydrology—ponding water for extended periods during  
 5 the rainy season—because the underlying claypan or hardpan soil layer characteristic of vernal pool  
 6 complexes is still intact. They were identified where grasslands were underlain by soil types typical  
 7 for vernal pools (see BDCP Chapter 2, Section 2.3.4, *Natural Communities*) but where interpretation  
 8 of aerial photography showed disturbed topography and on-the-ground observations indicated that  
 9 seasonal ponding is occurring and habitat for vernal pool species is present. Despite the disturbance,  
 10 areas mapped as grassland with degraded vernal pools can still function as habitat for federally  
 11 listed and state-listed vernal pool species. Tables 12-2 and 12-3 list special-status plant and wildlife  
 12 species that could occur in degraded vernal pool grassland. These species are similar to those  
 13 described for the vernal pool complex natural community.

#### 14 **Managed Wetland**

15 The managed wetland natural community consists of areas that are intentionally flooded and  
 16 managed during specific seasonal periods to enhance habitat values for specific wildlife species  
 17 (CALFED Bay-Delta Program 2000). The associated ditches and drains used to manage the water  
 18 level are included in this community. In Suisun Marsh (CZ 11), land management practices largely  
 19 dictate natural community types. The classification as either tidal brackish emergent wetland, as  
 20 described above, or as managed wetland is determined by the presence of a levee or dike and the  
 21 side of the structure on which the vegetation is located. San Francisco Estuary Institute's EcoAtlas  
 22 GIS dataset was used as a general guide to determine whether vegetation units in Suisun Marsh  
 23 would be considered managed wetland or tidal brackish emergent wetland. This natural community  
 24 is considered special-status because many of the wetland areas that are part its mosaic of habitats  
 25 qualify as wetlands protected by Section 404 of the CWA, and waters of the state protected by the  
 26 Porter-Cologne Act. The community is also of special interest to resource agencies responsible for  
 27 managing waterfowl and shorebird populations in California.

28 Managed wetland is distributed throughout the study area. Substantial acreage of this type occurs in  
 29 the Yolo Bypass (CZ 2), Stone Lakes NWR (CZ 4), Cosumnes River Preserve (CZ 4), and Suisun Marsh  
 30 (CZ 11) (Suisun Ecological Workgroup 1997; California Department of Fish and Game 2008a; U.S.  
 31 Fish and Wildlife Service 2007a). Several islands in the central Delta support large areas of this  
 32 community type, including Mandeville Island, Medford Island, Holland Tract, and Bradford Island  
 33 (CZ 6). The far western edge of the Delta, including Van Sickle and Chipps islands (CZ 5), and Suisun  
 34 Marsh (CZ 11) also includes managed wetlands. Water at the far western border of the study area  
 35 and in Suisun Marsh can be more brackish compared with other portions of the Delta where this  
 36 community occurs (Suisun Ecological Workgroup 1997).

37 The typical hydrologic management regime includes flooding during the winter arrival of migratory  
 38 birds, followed by a slow draw down to manage plant seed production and to control mosquito  
 39 populations. Summer irrigation may also be conducted (U.S. Fish and Wildlife Service 2007a). The  
 40 management of Suisun Marsh is unique because water salinity is a significant management issue and  
 41 water use is carefully regulated (Suisun Ecological Workgroup 1997).

42 The managed wetland community is characterized by robust, perennial emergent vegetation and  
 43 annual-dominated moist-soil grasses and forbs in freshwater areas (Hickson and Keeler-Wolf 2007)  
 44 and often by pickleweed and brass buttons in brackish water areas. Vegetation that is important to

1 waterfowl includes alkali bulrush, grand redstem, brass buttons, knotweed, barnyard grass,  
 2 burhead, and swamp timothy (Suisun Ecological Workgroup 1997; U.S. Fish and Wildlife Service  
 3 2007a). During periods when water is drained from the habitat, a wide variety of annual grasses and  
 4 forbs germinate and grow beneath and in the space around clumping emergent plants, such as  
 5 cattails and tules.

6 Managed wetlands are often managed specifically as habitat for wintering waterfowl species,  
 7 including northern pintail, mallard, American wigeon, green-winged teal, northern shoveler,  
 8 gadwall, cinnamon teal, ruddy duck, canvasback, white-fronted goose, and Canada goose. Some  
 9 wetlands are also managed for breeding waterfowl, especially mallards. They also may be managed  
 10 specifically for the high diversity of shorebirds (e.g., at the Yolo Basin Wildlife Area) that also rely on  
 11 wetlands in the study area for habitat during winter and long-distance migrations. Species regularly  
 12 observed during these periods include western and least sandpiper, long- and short-billed  
 13 dowitchers, dunlin, greater and lesser yellowlegs, whimbrel, long-billed curlew, and wilson's  
 14 phalarope. Other wildlife that uses managed wetlands includes those described for tidal brackish  
 15 emergent wetland (especially for managed wetland in Suisun Marsh), nontidal freshwater perennial  
 16 emergent wetland, and tidal freshwater emergent wetland. Tables 12-2 and 12-3 list special-status  
 17 plant and wildlife species supported by the managed wetland natural community. The community is  
 18 mapped in Figure 12-1.

### 19 **Other Natural Seasonal Wetland**

20 The other natural seasonal wetlands natural community encompasses all the remaining natural (not  
 21 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.  
 22 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) consist of seasonally ponded,  
 23 flooded, or saturated soils dominated by grasses, sedges, or rushes. Other natural seasonal wetlands  
 24 are freshwater wetlands characterized by ponded or saturated soil conditions during winter and  
 25 spring and by dry soil conditions throughout summer and fall until the first substantial rainfall. The  
 26 vegetation of seasonal wetlands is typically composed of wetland generalist species such as hyssop  
 27 loosestrife, cocklebur, dallis grass, Bermuda grass, barnyard grass, and Italian ryegrass, which  
 28 typically occur in frequently disturbed sites. Some of the dominant plant species in other natural  
 29 seasonal wetland are the same as those cultivated in the managed wetland community. Species  
 30 dominance varies according to flooding regime.

31 Other natural seasonal wetlands is considered a special-status natural community because it  
 32 typically qualifies as jurisdictional wetlands subject to USACE jurisdiction under Section 404 of the  
 33 CWA, and wetlands subject to regulation under the Porter-Cologne Act. Wildlife species and plants  
 34 associated with seasonal wetlands are discussed in the previous description of the vernal pool  
 35 complex community. Table 12-2 lists the covered species supported by the other natural seasonal  
 36 wetland natural community; the community is mapped in Figure 12-1.

### 37 **Grassland**

38 The grassland community is a spectrum ranging from natural to intensively managed vegetation  
 39 dominated by grasses. At the more natural end of the spectrum, this natural community consists of  
 40 introduced or native annual and perennial grasses and forbs (nongrass herbaceous species)  
 41 (Hickson and Keeler-Wolf 2007). At the intensively managed end of the spectrum, it includes  
 42 nonirrigated pasturelands (CALFED Bay-Delta Program 2000). Grasslands are often found adjacent  
 43 to wetland and riparian habitats and are the dominant community on managed levees in the Delta

1 (Hickson and Keeler-Wolf 2007). The distribution of the grassland community in the study area is  
2 shown on Figure 12-1.

3 Grassland communities are generally dominated by nonnative species, such as wild oats, various  
4 bromes and barleys, Italian ryegrass, filarees, mustards, wild radish, mallows, vetches, and star-  
5 thistles. They may also support infrequent native annual and perennial grasses and forbs. In some  
6 areas of the Delta, the grassland community is interspersed with vernal pool complex, alkali  
7 seasonal wetland complex, and other natural seasonal wetland natural community types. The recent  
8 revision of *A Manual of California Vegetation* (Sawyer et al. 2009) recognizes the broad spectrum of  
9 grassland types and includes vegetation types ranging from those that are completely dominated by  
10 nonnative annual grasses to grasslands that are dominated by perennial native grasses. Within the  
11 study area, the grassland community that contains patches of other vegetation types can include  
12 alkali milk-vetch, Heckard's pepper-grass, and San Joaquin spearscale.

13 The grassland community designation has also been applied to areas that have been cleared of their  
14 natural vegetation cover, such as levee faces and edges of agricultural fields and roads. Vegetation in  
15 these areas is best characterized as ruderal. Ruderal vegetation is dominated by herbaceous,  
16 nonnative, plant species, some of which are considered invasive (see discussion in Section 12.1.4  
17 below). Representative species that occur in ruderal grassland areas are common mallow, bull  
18 thistle, bindweed, poison hemlock, wild lettuce, Russian thistle, and many nonnative annual grasses,  
19 including wild oats, bromes, and barleys. Ruderal vegetation on maintained levees throughout the  
20 Delta can be a persistent source of seeds of nonnative plants, some of which are considered invasive.  
21 Some native annuals, such as common spikeweed and willowherb, are also common.

22 Fallow fields and disturbed fields (ruderal lands) often are dense, monotypic stands of invasive  
23 ("weedy") plants that provide limited wildlife values. The range of invasive plant species in the Delta  
24 consists of herbaceous, shrub, and tree species that can occur in aquatic, wetland, and/or upland  
25 habitats. Wildlife habitat values can be affected by invasive plant species through several means,  
26 including physical alteration of habitat structure (e.g., the formation of dense stands that restrict  
27 wildlife movement, or a reduction in suitable cover and nest sites) altering food webs (e.g., reducing  
28 invertebrate prey populations), and disrupting biogeochemical processes (e.g., altering the timing of  
29 carbon availability).

30 Ruderal and grassland communities provide foraging, breeding, and cover habitat value for a variety  
31 of wildlife species, including gopher snake, western racer, western meadowlark, red-tailed hawk,  
32 western harvest mouse, and California vole. Wildlife communities in fallow and ruderal fields are  
33 often similar to those in cultivated row crop or silage fields. The absence of active cultivation  
34 increases the potential for successful bird nesting; however, these habitats provide limited breeding  
35 habitat for grassland-associated wildlife, such as western meadowlark, American goldfinch, and red-  
36 winged blackbird. Tables 12-2 and 12-3 list special-status plant and wildlife species supported by  
37 grassland and cultivated lands.

### 38 **Inland Dune Scrub**

39 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes  
40 associated with river and estuarine systems. In the study area, the inland dune scrub community  
41 consists of remnants of low-lying ancient stabilized dunes related to the Antioch Dunes formation  
42 located near the town of Antioch (CZ 10). The historic vegetation of these largely stabilized ancient  
43 interior dunes included perennial grassland, oak woodland, and local "blowout" areas (naturally



1 disturbed, unstable, wind-eroded and depositional sites, or river-cut sand cliffs, within stabilized  
2 dunes) that supported the distinctive dune species that survive at the Antioch Dunes NWR.

3 The remaining dune remnants in the Delta are highly fragmented and in many cases are dominated  
4 by nonnative weedy vegetation and trees, as opposed to the characteristic native vegetation of  
5 interior dune remnants at Antioch Dunes NWR. Stabilized sand dunes are found on Brannan Island,  
6 south of Dutch Slough (CZ 5), and in other small areas throughout the study area. Plant communities  
7 found on dune soils typically are dominated by ripgut brome, yellow star-thistle, telegraph weed,  
8 wild lettuce, wild radish, beach suncup, and yarrow, with occasional shrubs such as deerweed, nude  
9 buckwheat, Chamisso's lupine, and silver bush lupine.

10 Inland dune scrub is considered a special-status natural community because it provides suitable  
11 habitat for Antioch Dunes evening primrose and Contra Costa wallflower, which are federally and  
12 state listed as endangered. Because of their limited distribution, the presence of sensitive species,  
13 and their declining geographic extent, dunes are also tracked by CDFW.

14 Rare invertebrates have been collected at the isolated dune habitat at Antioch Dunes NWR since the  
15 1930s. Wildlife species associated with this habitat include mammals, such as Botta's pocket gopher,  
16 California ground squirrel, Townsend's mole, and black-tailed jackrabbit; reptiles, such as western  
17 racer, side-blotched lizard, and western fence lizard; and various resident and migratory bird  
18 species. Tables 12-2 and 12-3 list special-status plant and wildlife species supported by the inland  
19 dune scrub natural community. The community is mapped in Figure 12-1.

## 20 **Cultivated Lands**

21 Cultivated lands is the predominant land cover type in the study area. These lands have been  
22 subdivided into two broad types – cropland and non-cropland – to better understand the  
23 relationship between cultivated lands and the species analyzed in this chapter. Cropland includes  
24 the major crops and cover types in agricultural production, including small grains (wheat and  
25 barley), field crops (corn, sorghum, and safflower), truck crops (tomatoes and sugar beets), forage  
26 crops (hay and alfalfa), irrigated pastures, orchards, and vineyards. Non-cropland includes  
27 agricultural areas used for farmsteads, livestock feedlots, dairies, poultry farms, and small roads,  
28 ditches and nonplanted areas associated with cultivated lands.

29 The distribution of seasonal crops varies annually within the study area, depending on crop-rotation  
30 patterns and market forces. A more detailed description of the distribution of crop types is provided  
31 in Chapter 14, *Agricultural Resources*. General cropping practices result in monotypic stands of  
32 vegetation for the growing season and bare ground in fall and winter. Regular maintenance of fallow  
33 fields, roads, ditches, and levee slopes, can reduce the establishment of ruderal vegetation or native  
34 plant communities. Tables 12-2 and 12-3 list special-status plant and wildlife species supported by  
35 cultivated lands. These lands are mapped in Figure 12-1. Some of the principal crop types and their  
36 value to wildlife are discussed below.

### 37 ***Alfalfa***

38 Alfalfa is an irrigated, intensively mowed, leguminous crop that constitutes a dynamic habitat.  
39 Vegetation structure varies with the growing, harvesting, and fallowing cycles. Alfalfa is rotated  
40 periodically with other crops, such as vegetables and cereal grains. It is a very productive crop that  
41 does not require frequent tilling, so it can support large populations of small mammals (e.g., voles)  
42 and invertebrate species. As a result, it provides high-value foraging habitat for wildlife, including

1 wading birds, shorebirds, blackbirds, and hawks. Some of these species, such as shorebirds, use the  
2 fields when they are periodically flood irrigated. Alfalfa can be particularly important to Swainson's  
3 hawk, white-tailed kite, and other raptor species, which capitalize on high prey densities and cycles  
4 of increased prey availability when the fields are being irrigated and mowed.

### 5 ***Irrigated Pasture***

6 Irrigated pastures are managed grasslands that are not typically tilled or disturbed frequently. They  
7 are usually managed with a low structure of native herbaceous plants, cultivated species, or a  
8 mixture of both. Irrigated pastures provide breeding opportunities for ground-nesting birds and  
9 burrowing animals, such as burrowing owl, western meadowlark, California ground squirrel, and  
10 Botta's pocket gopher. The open structure of irrigated pastures provides foraging habitat for  
11 grassland-foraging wildlife, such as red-tailed hawk, northern harrier, American kestrel, and coyote.

### 12 ***Rice***

13 Rice is a flood-irrigated crop of seed-producing annual grasses. It is maintained in a flooded state  
14 until near maturation. Rice is usually grown in areas that previously supported natural wetlands,  
15 and many wetland wildlife species use rice fields, especially waterfowl and shorebirds. Waste grain  
16 also provides food for species such as ring-necked pheasant and sandhill crane. Other wildlife that  
17 use rice fields include giant garter snake, bullfrog, and wading birds that forage on aquatic  
18 invertebrates and small vertebrates, such as crayfish and small fishes. Rice fields provide habitat for  
19 a range of wintering waterfowl species in the Yolo Bypass. In particular, the practice of flooding rice  
20 fields in winter to allow rice stubble to rot, instead of burning rice stubble in the fall, provides a wide  
21 variety of ducks and geese an opportunity to loaf or forage in rice fields in winter and important  
22 foraging habitat for shorebirds. Fallow rice fields also provide important habitat for geese, cranes,  
23 large herons and egrets and can also provide breeding habitat for waterfowl such as mallards and  
24 gadwall.

### 25 ***Other Cultivated Crops***

26 Other cultivated crops include grain and seed crops, as well as row crops and silage. Grain and seed  
27 crops are annual grasses that are grown in dense stands and include corn, wheat and barley, and  
28 others. Because the dense growth makes it difficult to move through these fields, most of the wildlife  
29 values are derived during the early growing period, and especially following the harvest, when  
30 waste grain is accessible to waterfowl and other birds, such as sandhill cranes. In some areas of the  
31 Delta, grain fields support a substantial proportion of the sandhill crane population that winters in  
32 California.

33 Although generally of lesser value to wildlife than native habitats, row crop and silage fields often  
34 support abundant populations of small mammals, such as western harvest mouse and California  
35 vole. These species in turn attract predators such as gopher snake, western racer, American kestrel,  
36 and red-tailed hawk. Other reptile and bird species prey on the insect populations abundant in row  
37 crop and silage fields, including western fence lizard, Brewer's blackbird, American crow, and the  
38 nonnative European starling.

### 39 ***Orchards***

40 Orchards are habitats dominated by a single tree species. Trees are usually kept fairly low and  
41 bushy, with a mostly closed canopy and an open understory. Orchards usually are grown on fertile  
42 land that formerly supported diverse and productive natural habitats and wildlife. Orchard habitats

1 are used by several common woodland-associated species, such as western gray squirrel, American  
 2 robin, red-tailed hawk, bats, and the nonnative black rat. The western red bat (a state species of  
 3 special concern, see Special-Status Species below) is known to roost in orchards which may serve as  
 4 an alternative habitat to the species' more preferred habitat of large cottonwoods, sycamores, and  
 5 oaks (Pierson et al. 2006)

### 6 **Vineyards**

7 Vineyards are single-species vines grown in rows on trellises. Rows are normally formed by  
 8 intertwining vines, with open spaces between the rows, and movement between rows is restricted.  
 9 The spaces between rows either are barren soil or are composed of a cover crop of natural or  
 10 domesticated herbaceous plants. Vineyards are usually grown on fertile land that formerly  
 11 supported diverse and productive natural habitats and wildlife. Except for some common species,  
 12 such as mourning dove, and raptors that use perches and nest boxes installed to attract raptors to  
 13 control pest species, vineyards provide little wildlife habitat.

### 14 **Developed Lands**

15 Additional lands in the study area that were not designated with a natural community type are  
 16 characterized here as developed lands. Developed lands include lands with residential, industrial,  
 17 and urban land uses, as well as landscaped areas, riprap, road surfaces and other transportation  
 18 facilities. Developed lands support some common plant and wildlife species, whose abundance and  
 19 species richness vary with the intensity of development. Dense urban areas support less wildlife  
 20 than less dense suburban settings support. Suburban areas with mature trees (ornamental or  
 21 native) can approximate a natural environment and more native species may occur than in other  
 22 urban settings. Bird species include house sparrow, house finch, western scrub-jay, and European  
 23 starling in more urban zones, progressing to wren, bushtit, white-tailed kite, red-tailed hawk, red-  
 24 shouldered hawk, and California quail in more suburban environments.

25 Mammal species in urban residential areas include raccoon, opossum, and striped skunk, with black-  
 26 tailed deer and black-tailed jackrabbit in more suburban settings. California slender salamander,  
 27 gopher snake, and western fence lizard could also be present in these areas. Riprap on levees  
 28 provides potential upland habitat for a number of aquatic wildlife species, including the federally  
 29 and state-listed giant garter snake (see BDCP Appendix 2.A, Section 2A.28.2 and the following  
 30 section for more species information). Riprap on levees provides a thermal gradient, warm surfaces  
 31 and cooler underground refuges, similar to burrows adjacent to aquatic habitats in locations where  
 32 burrows may be limiting. Riprap is included in a GIS data layer in the habitat modeling completed  
 33 for the BDCP.

## 34 **12.1.3 Special-Status Species**

35 This chapter addresses plant and wildlife species selected for coverage under the BDCP and other  
 36 special-status species that have a potential to occur in the study area or to be adversely affected by  
 37 the BDCP but that did not meet the BDCP screening criteria for covered species.

38 As described in BDCP Appendix 1.A, *Evaluation of Species Considered for Coverage*, the BDCP  
 39 planning process included an evaluation of 234 special-status species for coverage under the BDCP.  
 40 Species considered for BDCP coverage were limited to special-status species that were known or  
 41 believed to occur near the Plan Area. All such species met one or more of the following criteria.

- 1 • Are listed as threatened or endangered under ESA.
- 2 • Are proposed or candidates for listing under ESA.
- 3 • Are listed as threatened or endangered under CESA.
- 4 • Are candidates for listing under CESA.
- 5 • Are California species of special concern.
- 6 • Are California fully protected species.
- 7 • Are U.S. Fish and Wildlife Service (USFWS) birds of conservation concern.
- 8 • Are National Marine Fisheries Service (NMFS) species of concern.
- 9 • Are plants listed as rare under the California Native Plant Protection Act (NPPA).
- 10 • Are plants with a California Rare Plant Rank (CRPR) of 1A, 1B, or 2.

11 The BDCP evaluation process used four criteria to determine which special-status species were  
12 proposed for coverage under the BDCP.

- 13 • Listing status of the species.
- 14 • Likelihood that the species is present in the Plan Area or other areas within the geographic  
15 scope.
- 16 • Potential for the species to be adversely affected by BDCP covered activities, including the  
17 implementation of conservation measures.
- 18 • Information available to determine effects on species and to identify effective conservation  
19 measures.

20 Species that met all four criteria were proposed for coverage under the BDCP, as described in BDCP  
21 Appendix 1.A. These covered species are listed in Table 12-2 and are analyzed in this EIR/EIS. Table  
22 12-2 also identifies the BDCP natural communities and land cover types that these species are  
23 associated with. More detailed descriptions of the habitat models used for the covered species can  
24 be found in BDCP Appendix 2.A, *Covered Species Accounts*. The location of the impact discussions for  
25 each of these species can be tracked by the impact numbers listed in the table. Impacts are  
26 numbered sequentially under each alternative discussion in Section 12.3.3.

27 A similar but slightly expanded set of criteria was used for identifying other special-status species  
28 that did not meet the criteria for inclusion in the BDCP but that do warrant inclusion this EIR/EIS. In  
29 the EIR/EIS, special-status species are legally protected or otherwise considered sensitive by  
30 federal, state, or local resource agencies. Special-status species are species, subspecies, or varieties  
31 that fall into one or more of these categories.

- 32 • Are listed as threatened or endangered under ESA.
- 33 • Are proposed or candidates for listing under ESA.
- 34 • Are listed as threatened or endangered under CESA.
- 35 • Are plants listed as rare under the NPPA.
- 36 • Are candidates for listing under CESA.

- 1       • Are taxa (i.e., taxonomic categories or groups) that meet the criteria for listing, even if not
- 2       currently included on any list, as described in Section 15380 of the State CEQA Guidelines (e.g.,
- 3       species that appear on the CDFW special animals list).
- 4       • Are California species of special concern.
- 5       • Are California fully protected species.
- 6       • Are species identified on the Western Bat Working Group list (1998).
- 7       • Are plants ranked as “rare, threatened, or endangered in California” (CRPR 1B and 2).
- 8       • Are plants that may warrant consideration on the basis of local significance or recent biological
- 9       information (CEQA Guidelines Section 15380[d]), which may include some CRPR 3 and 4 species
- 10      (plants about which more information is needed to determine their status and plants of limited
- 11      distribution).
- 12      • Some plant species included on the CNDDDB *Special Plants, Bryophytes, and Lichens List* (current
- 13      list available: <http://www.dfg.ca.gov/biogeodata>).
- 14      • Are plants considered to be locally significant species, that is, species that are not rare from a
- 15      statewide perspective but are rare or unique in a local context, such as within a county or region
- 16      (CEQA §15125 [c]) or are so designated in local or regional plans, policies, or ordinances (CEQA
- 17      Guidelines, Appendix G).

18      Table 12-3 provides a list of noncovered special-status species that are addressed in this EIR/EIS.

19      Table 12-3 also identifies the BDCP natural communities and land cover types that these species are

20      associated with. More detailed descriptions of the habitat models developed by ICF and used for the

21      noncovered species analysis can be found below in Sections 12.1.3.2 and 12.1.3.3. The location of the

22      impact discussions for each of these species can be tracked by the impact numbers listed in the

23      table. Impacts are numbered sequentially under each alternative discussion in Section 12.3.3.

1 Table 12-2. Covered Special-Status Species Supported by the Natural Communities, Cultivated Lands and Developed Lands of the Study Area

Common Name <i>Scientific Name</i>	Impacts	Natural Communities											Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS
<b>Mammals</b>															
Riparian brush rabbit <i>Sylvilagus bachmani riparius</i>	152-154				X								X		
Riparian woodrat (San Joaquin Valley) <i>Neotoma fuscipes riparia</i>	155-157				X										
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	158, 159		X		X			X		X			X <sup>a</sup>		
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	162, 163								X				X		X
Suisun shrew <i>Sorex ornatus sinuosus</i>	160-161		X		X			X <sup>a</sup>					X <sup>a</sup>		
<b>Birds</b>															
California black rail <i>Laterallus jamaicensis coturniculus</i>	57-61		X	X			X			X					
California clapper rail <i>Rallus longirostris obsoletus</i>	62-65		X	X											
Greater sandhill crane <i>Grus canadensis tabida</i>	69-71							X	X	X	X	X			X
Least Bell's vireo <i>Vireo bellii pusillus</i>	75-79				X										
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	80-82		X	X						X					
Swainson's hawk <i>Buteo swainsoni</i>	83-86				X			X	X	X	X	X			X
Tricolored blackbird <i>Agelaius tricolor</i>	87-90		X	X	X		X	X	X	X	X	X			X
Western burrowing owl <i>Athene cunicularia hypugaea</i>	91-94							X	X	X	X	X			X

Common Name <i>Scientific Name</i>	Impacts	Natural Communities												Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS			
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	95-99				X											
White-tailed kite <i>Elanus leucurus</i>	100-103				X			X	X	X	X	X				X
Yellow-breasted chat <i>Icteria viriens</i>	104-108				X											
<b>Reptiles</b>																
Giant garter snake <i>Thamnophis gigas</i>	49-51	X		X	X	X	X	X	X	X	X	X	X	X	X <sup>b</sup>	X
Western pond turtle <i>Actinemys marmorata</i>	52-54	X	X	X	X	X	X	X	X	X	X	X				X
<b>Amphibians</b>																
California red-legged frog <i>Rana draytonii</i>	44, 45			X	X	X	X	X	X	X	X	X				X
California tiger salamander (Central Valley distinct population segment [DPS]) <i>Ambystoma californiense</i>	46-48							X	X		X	X				
<b>Invertebrates</b>																
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	35-37				X				X <sup>c</sup>			X <sup>c</sup>				
California linderiella <i>Linderiella occidentalis</i>	32-34							X	X							
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	32-34							X	X							
Longhorn fairy shrimp <i>Branchinecta longiantenna</i>	32-34							X	X							
Midvalley fairy shrimp <i>Branchinecta mesovallensis</i>	32-34							X	X							
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	32-34							X	X							

Common Name <i>Scientific Name</i>	Impacts	Natural Communities												Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS			
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	32-34							X	X							
<b>Plants</b>																
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	169							X	X				X			
Boggs Lake hedge-hyssop <i>Gratiola heterosepala</i>	169								X							
Brittlescale <i>Atriplex depressa</i>	170							X	X							
Carquinez goldenbush <i>Isocoma arguta</i>	171												X			
Delta button celery <i>Eryngium racemosum</i>	170, 172				X			X	X							
Delta mudwort <i>Limosella australis</i>	173		X	X	X											
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	173		X	X	X											
Dwarf downingia <i>Downingia pusilla</i>	169								X							
Heartscale <i>Atriplex cordulata</i>	170							X	X				X			
Heckard's peppergrass <i>Lepidium latipes</i> var. <i>heckardii</i>	169, 170							X	X							
Legenere <i>Legenere limosa</i>	169								X							
Mason's lilaepsis <i>Lilaeopsis masonii</i>	173		X	X	X											
San Joaquin spearscale <i>Atriplex joaquiniana</i>	170							X	X							
Side-flowering skullcap <i>Scutellaria lateriflora</i>	173			X	X							X				



Common Name <i>Scientific Name</i>	Impacts	Natural Communities												Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS			
Slough thistle <i>Cirsium crassicaule</i>	172				X		X									
Soft bird's-beak <i>Chloropyron molle</i> subsp. <i>molle</i>	173		X													
Suisun Marsh aster <i>Symphyotrichum lentum</i>	173		X	X	X											
Suisun thistle <i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	173		X													

Natural community codes:

- TPA = tidal perennial aquatic
- TBEW = tidal brackish emergent wetland
- TFEW = tidal freshwater emergent wetland
- VFR = valley/foothill riparian
- NPA = nontidal perennial aquatic
- NFPEW = nontidal freshwater perennial emergent wetland
- ASWC = alkali seasonal wetland complex
- VPC = vernal pool complex
- MW = managed wetland
- ONSW = other natural seasonal wetland
- G = grassland (also includes the subcategory of degraded vernal pool complex)
- IDS = inland dune scrub

- a These communities are identified as secondary habitats within 150 feet of primary habitat in the BDCP species model.
- b Riprap along Plan Area waterways is considered developed land and is included in the habitat modeling for giant garter snake.
- c Vernal pool complex and grasslands within 200 feet of streams are considered potential habitat for this species in the BDCP model.

1 **Table 12-3. Noncovered Special-Status Species Supported by the Natural Communities, Cultivated Lands and Developed Lands of the Study Area**

Common Name <i>Scientific Name</i>	Impacts	Natural Communities												Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS			
<b>Invertebrates</b>																
Antioch Adrenid Bee <i>Perdita scitula antiochensis</i>	--													X		
Antioch Dunes Anthicid Beetle <i>Anthicus antiochensis</i>	41				X									X		
Antioch Dunes halictid bee <i>Sphcodogastra antiochensis</i>	--													X		
Antioch Efferian Robberfly <i>Efferia antiochi</i>	--													X		
Antioch Mutillid Wasp <i>Myrmosula pacifica</i>	--													X		
Antioch Sphecid Wasp <i>Philanthus nasalis</i>	--													X		
Blennosperma Vernal Pool Andrenid Bee <i>Andrena blennospermatis</i>	38-40							X	X							
Callippe Silverspot Butterfly <i>Speyeria callippe</i>	43												X			
Curved-foot Hygrotus Diving Beetle <i>Hygrotus curvipes</i>	38-40							X	X							
Delta Green Ground Beetle <i>Elaphrus viridis</i>	42								X				X			
Hairy Water Flea <i>Dumontia oregonensis</i>	38-40							X	X							
Hurd's Metapogon Robberfly <i>Metapogon hurdi</i>	--													X		
Lange's Metalmark Butterfly <i>Apodemia mormo langei</i>	--													X		
Middlekauff's Shieldback Katydid <i>Idiostatus middlekauffi</i>	--													X		
Molestan Blister Beetle <i>Lytta molesta</i>	38-40								X				X			
Redheaded Sphecid Wasp <i>Eucerceris ruficeps</i>	--													X		

Common Name <i>Scientific Name</i>	Impacts	Natural Communities											Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS
Ricksecker's Water Scavenger Beetle <i>Hydrochara rickseckeri</i>	38-40							X	X						
Sacramento Anthicid Beetle <i>Anthicus sacramento</i>	41				X								X		
<b>Reptiles</b>															
Blainville's horned lizard <i>Phrynosoma blainvillii</i>	55, 56												X	X	
San Joaquin coachwhip <i>Coluber flagellum ruddocki</i>	55, 56							X	X				X		
Silvery legless lizard <i>Anniella pulchra pulchra</i>	55, 56													X	
<b>Birds</b>															
Bank swallow <i>Riparia riparia</i>	146, 147				X										
Black crowned night heron <i>Nycticorax nycticorax</i>	117-120				X										
Black tern <i>Chlidonias niger</i>	129a-129c														X
California horned lark <i>Eremophila alpestris actia</i>	130-133							X	X				X		X
California least tern <i>Sternula antillarum browni</i>	66-68	X													
Cooper's hawk <i>Accipiter cooperii</i>	109-112				X										
Double-crested cormorant <i>Phalacrocorax auritus</i>	117-120				X										
Ferruginous hawk <i>Buteo regalis</i>	113-116							X	X				X		X
Golden eagle <i>Aquila chrysaetos</i>	113-116							X	X				X		X
Grasshopper sparrow <i>Ammodramus savannarum</i>	130-133							X	X				X		X
Great blue heron <i>Ardea herodias</i>	117-120				X										

Common Name <i>Scientific Name</i>	Impacts	Natural Communities											Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS
Great egret <i>Ardea alba</i>	117-120				X										
Least bittern <i>Ixobrychus exilis</i>	134-137			X			X			X	X				
Lesser sandhill crane <i>Grus canadensis canadensis</i>	72-74							X	X	X	X	X			X
Loggerhead shrike <i>Lanius ludovicianus</i>	138-141							X	X			X			X
Mountain plover <i>Charadrius montanus</i>	125-128							X	X			X			X
Northern harrier <i>Circus cyaneus</i>	121-124		X	X			X	X	X	X	X	X			X
Osprey <i>Pandion haliaetus</i>	119-112				X										
Redhead <i>Aythya americana</i>	178-183						X			X					
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	80-82		X	X						X					
Short-eared owl <i>Asio flammeus</i>	121-124		X	X			X	X	X	X	X	X			X
Snowy egret <i>Egretta thula</i>	117-120				X										
Song sparrow "Modesto" population <i>Melospiza melodia</i>	142-145			X	X		X			X	X				
Tule greater white-fronted goose <i>Anser albifrons</i>	178-183						X			X					
White-faced ibis <i>Plegadis chihi</i>	134-137			X			X			X	X				
Yellow warbler <i>Setophaga petechia</i>	75-79				X										
Yellow-headed blackbird <i>Xanthocephalus xanthocephalus</i>	148-151			X			X	X	X	X	X	X			X

Common Name <i>Scientific Name</i>	Impacts	Natural Communities												Developed Lands	Cultivated Lands
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS		
<b>Mammals</b>															
American Badger <i>Taxidea taxus</i>	162, 163								X	X			X		
Big brown bat <i>Eptesicus fuscus</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
California myotis <i>Myotis californicus</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Canyon bat <i>Parastrellus hesperus</i>	166-168											X	X		
Hoary bat <i>Lasiurus cinerus</i>	166-168	X	X	X	X	X	X	X	X	X	X	X		X	X
Little brown myotis <i>Myotis lucifugus</i>	166-168	X	X	X	X	X	X	X	X	X	X	X			X
Mexican free-tailed bat <i>Tadarida brasiliensis</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pallid bat <i>Antrozus pallidus</i>	166-168											X	X	X	X
San Joaquin pocket mouse <i>Perognathus inornatus inornatus</i>	164, 165											X			
Silver-haired bat (migration only) <i>Lasionycteis noctivagans</i>	166-168				X	X	X	X	X	X	X	X	X	X	X
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Western mastiff bat <i>Eumops perotis</i>	166-168								X			X	X	X	X
Western red bat <i>Lasiurus blossevillii</i>	166-168				X	X	X					X			X
Western small-footed myotis <i>Myotis ciliabrum</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Yuma myotis <i>Myotis yumanensis</i>	166-168	X	X	X	X	X	X	X	X	X	X	X		X	X

Common Name <i>Scientific Name</i>	Impacts	Natural Communities											Developed Lands	Cultivated Lands
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G		
<b>Plants</b>														
Ferris's milk vetch <i>Astragalus tener</i> var. <i>ferrisiae</i>	169							X	X					
Crownscale <i>Atriplex coronata</i> var. <i>coronata</i>	170							X	X					
Vernal pool smallscale <i>Atriplex persistens</i>	169								X					
Big tarplant <i>Blepharizonia plumosa</i>	171										X			
Watershield <i>Brasenia schreberi</i>	175					X	X							
Round-leaved filaree <i>California macrophylla</i>	171										X			
Bristly sedge <i>Carex comosa</i>	175						X							
Pappose tarplant <i>Centromadia parryi</i> subsp. <i>parryi</i>	171							X			X			
Parry's rough tarplant <i>Centromadia parryi</i> subsp. <i>rudis</i>	171							X	X		X			
Palmate-bracted bird's-beak <i>Chloropyron palmatum</i>	170							X	X					
Bolander's water-hemlock <i>Cicuta maculata</i> var. <i>bolanderi</i>	173		X	X										
Small-flowered morning-glory <i>Convolvulus simulans</i>	171										X			
Hoover's cryptantha <i>Cryptantha hooveri</i>	174										X	X		
Recurved larkspur <i>Delphinium recurvatum</i>	170							X			X			
Streamside daisy <i>Erigeron bioletti</i>	171										X			
Antioch Dunes buckwheat <i>Eriogonum nudum</i> var. <i>psychicola</i>	174											X		
Mt. Diablo buckwheat <i>Eriogonum truncatum</i>	174										X			

Common Name <i>Scientific Name</i>	Impacts	Natural Communities												Developed Lands	Cultivated Lands
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS		
Contra Costa wallflower <i>Erysimum capitatum</i> var. <i>angustatum</i>	174												X		
Diamond-petaled California poppy <i>Eschscholzia rhombipetala</i>	171												X		
Stinkbells <i>Fritillaria agrestis</i>	171												X		
Fragrant fritillary <i>Fritillaria liliacea</i>	171												X		
Hogwallow starfish <i>Hesperovax caulescens</i>	169								X				X		
Woolly rose-mallow <i>Hibiscus lasiocarpus</i> subsp. <i>occidentalis</i>	175			X	X		X								
Northern California black walnut <i>Juglans hindsii</i>	172				X										
Contra Costa goldfields <i>Lasthenia conjugens</i>	169								X						
Ferris' goldfields <i>Lasthenia ferrisiae</i>	169							X	X						
Cotulaleaf navarretia <i>Navarretia cotulifolia</i>	169							X	X			X			
Baker's navarretia <i>Navarretia leucocephala</i> subsp. <i>bakeri</i>	169								X						
Colusa grass <i>Neostapfia colusana</i>	169								X						
Antioch Dunes evening-primrose <i>Oenothera deltoides</i> subsp. <i>howellii</i>	174												X		
Gairdner's yampah <i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>	171											X			
Bearded popcorn-flower <i>Plagiobothrys hystriculus</i>	169								X						
Eel grass pondweed <i>Potamogeton zosteriformis</i>	175					X	X								
Delta woolly marbles <i>Psilocarphus brevissimus</i> var. <i>multiflorus</i>	169								X						

Common Name <i>Scientific Name</i>	Impacts	Natural Communities											Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS
Sanford's arrowhead <i>Sagittaria sanfordii</i>	175			X		X	X								
Marsh skullcap <i>Scutellaria galericulata</i>	175			X	X		X								
Keck's checkerbloom <i>Sidalcea keckii</i>	171											X			
Wright's trichocoronis <i>Trichocoronis wrightii</i> var. <i>wrightii</i>	172				X		X								
Saline clover <i>Trifolium hydrophilum</i>	169		X					X	X						
Caper-fruited tropidocarpum <i>Tropidocarpum capparideum</i>	171							X				X			
Solano grass <i>Tuctoria mucronata</i>	169								X						

## Natural community codes:

TPA	=	tidal perennial aquatic.
TBEW	=	tidal brackish emergent wetland.
TFEW	=	tidal freshwater emergent wetland.
VFR	=	valley/foothill riparian.
NPA	=	nontidal perennial aquatic.
NFPEW	=	nontidal freshwater perennial emergent wetland.
ASWC	=	alkali seasonal wetland complex.
VPC	=	vernal pool complex.
MW	=	managed wetland.
ONSW	=	other natural seasonal wetland
G	=	grassland.
IDS	=	inland dune scrub.



1 **12.1.3.1 Critical Habitat**

2 Critical habitat refers to areas designated by the USFWS for the conservation of species listed as  
 3 threatened or endangered under the ESA. When a species is proposed for listing under the ESA, the  
 4 USFWS considers whether there are certain areas essential to the conservation of the species.

5 Critical habitat is defined in Section 3 of the ESA as follows.

- 6 1. The specific areas within the geographical area occupied by a species at the time it is listed  
 7 in accordance with the Act, on which are found those physical or biological features:
- 8 a. essential to the conservation of the species, and
  - 9 b. that may require special management considerations or protection; and
- 10 2. Specific areas outside the geographical area occupied by a species at the time it is listed,  
 11 upon a determination that such areas are essential for the conservation of the species.

12 Any federally action (permit, license, or funding) in critical habitat requires that federal agency to  
 13 consult with the USFWS where the action has potential to adversely modify the habitat for the  
 14 species.

15 The federally listed wildlife and plant species that have designated critical habitat within the study  
 16 area are presented in Table 12-4 below. Critical habitat for each species is presented in the figures  
 17 referenced in the species discussions in Sections 12.1.3.3 and 12.1.3.4.

18 **Table 12-4. Designated Critical Habitat within the Study Area for Wildlife and Plant Species**

Species	Acres of Critical Habitat
Vernal pool tadpole shrimp	9,579
Conservancy fairy shrimp	3,340
Vernal pool fairy shrimp	11,090
Delta green ground beetle	321
California tiger salamander, Central California DPS	1,780
California red-legged frog	3,321
Suisun thistle	2,034
Soft bird’s-beak	1,706
Contra Costa wallflower	305
Antioch Dunes evening primrose	305
Contra Costa goldfields	5,138
Solano grass	0.4
Colusa grass	0.4

19

20 **12.1.3.2 Special-Status Wildlife Species**

21 Table 12A-2 in Appendix 12A, *Special-Status Species with Potential to Occur in the Study Area*,  
 22 provides information on the 116 special-status wildlife species that were identified for  
 23 consideration in the EIR/EIS, including common and scientific name, listing status (federal, state,

1 global rank, and/or state rank), notes on the species habitat, distribution in California, and potential  
 2 for occurrence in the study area. The species listed in this table were generated from queries of the  
 3 CNDDDB and the USFWS for the counties within the study area. Twenty-eight of these species are  
 4 covered species in the BDCP and 88 are noncovered species addressed in this EIR/EIS.

5 The following summaries provide information on the species' habitat requirements, distribution,  
 6 and occurrences within the study area. The habitat and distribution information for covered species  
 7 is largely based on the species account information found in BDCP Appendix 2.A, *Covered Species*  
 8 *Accounts*. The habitat and distribution information for noncovered species was developed for the  
 9 EIR/EIS by ICF staff. The habitat models for noncovered species described below were based on one  
 10 or more of the following characteristics: species range; natural communities in which the species are  
 11 found; specific vegetation alliances within each natural community; and occurrence records. In cases  
 12 where covered and noncovered species have the same habitat requirements (e.g., the covered least  
 13 Bell's vireo and the noncovered yellow warbler), modeled habitat for the covered species was  
 14 applied to the noncovered species. For a few species that have specific habitat elements that are at a  
 15 smaller scale than the minimum mapping units used in the BDCP vegetation/land cover dataset (e.g.,  
 16 sand bar habitat for anthicid beetles) the extent of habitat was qualitatively evaluated. Species  
 17 occurrence data were obtained from the CNDDDB and from field surveys conducted in support of the  
 18 Delta Habitat Conservation and Conveyance Program (DHCCP) (Appendix 12C, *2009–2011 Bay Delta*  
 19 *Conservation Plan EIR/EIS Environmental Data Report*). Additional occurrence records were  
 20 obtained from a number of species experts (Hansen, Ivey, pers. comm.) which are maintained in a  
 21 DHCCP GIS data set.

22 The following summaries include species account information found in BDCP Appendix 2.A *Covered*  
 23 *Species Accounts*, except where otherwise cited.

## 24 **Vernal Pool Crustaceans**

### 25 ***California Linderiella***

26 California linderiella, which has a NatureServe conservation status of vulnerable and a state  
 27 conservation status of imperiled to vulnerable, occurs in a variety of vernal pools and other seasonal  
 28 wetlands in the Central Valley and central coastal California. According to the BDCP habitat model  
 29 for this species, vernal pool complexes and alkali seasonal wetlands in CZ 8 provide potential  
 30 California linderiella habitat in the study area (Figure 12-5). There are 382 occurrences of California  
 31 linderiella throughout the state, including 13 in the study area (California Department of Fish and  
 32 Wildlife 2013). The study area includes portions of the Jepson Prairie core recovery area, which was  
 33 developed in part for the conservation of California linderiella.

### 34 ***Conservancy Fairy Shrimp***

35 Conservancy fairy shrimp, a federally listed endangered species, occurs in large turbid vernal pools  
 36 from Butte and Tehama Counties south to Ventura County. According to the BDCP habitat model for  
 37 this species, vernal pool complexes and alkali seasonal wetlands in CZ 8 provide potential  
 38 Conservancy fairy shrimp habitat in the study area (Figure 12-5). There are 34 known occurrences  
 39 of Conservancy fairy shrimp range-wide, six of which are in the study area (California Department of  
 40 Fish and Wildlife 2013). The study area includes a portion of Jepson Prairie, which is a core recovery  
 41 area for Conservancy fairy shrimp and supports three of these occurrences. The Collinsville core  
 42 recovery area, which was developed in part for Conservancy fairy shrimp, also lies within the study  
 43 area on the western edge of the Montezuma Hills but has no documented occurrences. In addition,

1 the study area contains critical habitat for Conservancy fairy shrimp between Potrero Hills and the  
2 northern limits of the study area, near Suisun Marsh.

### 3 ***Longhorn Fairy Shrimp***

4 Longhorn fairy shrimp, a federally listed endangered species, is typically found in small pools of  
5 relatively short ponding duration and in pools with alkali soils in scattered locations from Alameda  
6 to San Luis Obispo Counties. According to the BDCP habitat model for this species, vernal pool  
7 complexes and alkali seasonal wetlands in CZ 8 provide potential longhorn fairy shrimp habitat.  
8 There are no records of longhorn fairy shrimp in the study area, although there are occurrences  
9 southwest of the study area in the Byron Hills area (Figure 12-5) (California Department of Fish and  
10 Wildlife 2013). This area is part of the Altamont Hills core recovery area, which was developed in  
11 part for the recovery of longhorn fairy shrimp. A portion of this recovery area lies within the study  
12 area, just west of Clifton Court Forebay. This general area represents the most suitable habitat for  
13 the species in the study area. This species is very rare, with only 10 recorded occurrences  
14 throughout the state.

### 15 ***Midvalley Fairy Shrimp***

16 Midvalley fairy shrimp, which has a NatureServe conservation status of imperiled, occurs in vernal  
17 pools and other seasonal wetlands in the Central Valley from Sacramento County to Fresno County.  
18 According to the BDCP habitat model for this species, vernal pool complexes and alkali seasonal  
19 wetlands in CZ 8 provide potential midvalley fairy shrimp habitat in the study area (Figure 12-5).  
20 There are 99 CNDDDB species occurrences throughout the state, including seven CNDDDB occurrences  
21 in the study area and one DHCCP occurrence (California Department of Fish and Wildlife 2013,  
22 Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). The  
23 study area contains a portion of the Altamont Hill core recovery area, which was developed in part  
24 for the conservation of midvalley fairy shrimp.

### 25 ***Vernal Pool Fairy Shrimp***

26 Vernal pool fairy shrimp, a federally listed threatened species, occurs in vernal pools and other  
27 seasonal wetlands (including ditches) in the Central Valley from Shasta County to Tulare County and  
28 in the central and southern Coast Ranges from Solano County to Ventura County. According to the  
29 BDCP habitat model for this species, vernal pool complexes and alkali seasonal wetlands CZ 8  
30 provide potential vernal pool fairy shrimp habitat in the study area. There are 608 recorded  
31 occurrences throughout the state (California Department of Fish and Wildlife 2013; Appendix 12C,  
32 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*), including 18 in the  
33 study area (Figure 12-5). Some locations have multiple records from recent DHCCP surveys  
34 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). The  
35 study area covers portions of the Altamont Hills and Jepson Prairie core recovery areas, which were  
36 developed in part for the recovery of vernal pool fairy shrimp. The study area also includes critical  
37 habitat for vernal pool fairy shrimp from the Potrero Hills to the northern limits of the study area  
38 near Suisun Marsh, and in an area just west of Clifton Court Forebay.

### 39 ***Vernal Pool Tadpole Shrimp***

40 Vernal pool tadpole shrimp, which is listed as endangered under ESA, occurs in a variety of vernal  
41 pool and seasonal wetlands, typically those that pool into late spring, from Shasta County to Tulare  
42 County in the Central Valley and foothills, and in portions of the Bay Area in Alameda and Contra

1 Costa Counties. According to the BDCP habitat model for this species, vernal pool complexes and  
 2 alkali seasonal wetlands in CZ 8) provide potential vernal pool tadpole shrimp habitat in the study  
 3 area (Figure 12-5). There are 274 species occurrences throughout the state, including 16 in the  
 4 study area (California Department of Fish and Wildlife 2013). The study area covers portions of the  
 5 Collinsville and Jepson Prairie core recovery areas, which were developed in part for the recovery of  
 6 vernal pool tadpole shrimp. The study area also includes critical habitat for vernal pool tadpole  
 7 shrimp from the Potrero Hills to the northern limits of the study area near Suisun Marsh.

### 8 **Valley Elderberry Longhorn Beetle**

9 Valley elderberry longhorn beetle's life cycle is dependent on elderberry shrubs (its host plant) that  
 10 are adjacent to, or contiguous with, riparian forests, floodplains, or relict elderberry savannas. The  
 11 species, which is federally listed as threatened, occurs within the Central Valley and foothills up to  
 12 3,000 feet in elevation. BDCP modeled habitat for valley elderberry longhorn beetle within the study  
 13 area is composed of valley/foothill riparian, grassland within 200 feet of streams, and vernal pool  
 14 complex within 200 feet of streams (Figure 12-6). There are 201 extant CNDDDB records for valley  
 15 elderberry longhorn beetle across its range, including three within the study area (California  
 16 Department of Fish and Wildlife 2013). During surveys conducted in 2009, DWR identified several  
 17 areas with elderberry shrubs along Delta channels within the proposed water conveyance facilities  
 18 alignments (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*  
 19 *Report*). DHCCP mapped 312 locations with shrubs, mostly within the north and east Delta.

### 20 **Nonlisted Vernal Pool Invertebrates**

#### 21 ***Blennosperma Vernal Pool Andrenid Bee***

22 *Blennosperma vernal pool andrenid bee*, which has a NatureServe conservation status of imperiled,  
 23 is a solitary, ground-nesting bee that occurs in upland areas around vernal pools where its pollen  
 24 and nectar source, the vernal pool plant *Blennosperma*, grows (California Department of Fish and  
 25 Game 2006a). This species is known to occur throughout central California. Potential habitat in the  
 26 study area includes vernal pool complexes and alkali seasonal wetlands in CZ 8 (Figure 12-7). The  
 27 analysis for this species utilizes the BDCP's habitat model for vernal pool crustaceans. There are 15  
 28 CNDDDB records for this species across its range. One of these occurrences is located in the western  
 29 most portion of CZ 1 in the Jepson Prairie area (California Department of Fish and Wildlife 2013).

#### 30 ***Hairy Water Flea***

31 The hairy water flea, which has a NatureServe conservation status ranging from critically imperiled  
 32 to vulnerable, and a conservations status of critically imperiled in California, is a small crustacean  
 33 that occurs in vernal pools and is currently known to occur only in Agate Desert near Medford,  
 34 Oregon and in Sacramento and Solano Counties (NatureServe 2011a, U.S. Fish and Wildlife Service  
 35 2006). Vernal pool complexes and alkali seasonal wetlands in CZ 8 represent potential habitat for  
 36 this species in the study area. The analysis for this species utilizes the BDCP's habitat model for  
 37 vernal pool crustaceans. There are two CNDDDB records for this species in California, neither of  
 38 which is in the study area, though one occurs just to the north of CZ 11 near Travis Air Force Base  
 39 (Figure 12-7) (California Department of Fish and Wildlife 2013).

1 ***Ricksecker's Water Scavenger Beetle***

2 Ricksecker's water scavenger beetle, which has a NatureServe conservation status ranging from  
3 critically imperiled to imperiled, occurs in vernal pools and ponds in Northern California. Potential  
4 habitat for this species in the study area includes freshwater aquatic habitat (ponds), vernal pool  
5 complexes, and alkali seasonal wetlands in CZ 8 (Figure 12-7). The analysis for this species utilizes  
6 the BDCP's habitat model for vernal pool crustaceans. At the scale of the mapping used for BDCP, no  
7 freshwater ponds were mapped. There are 13 CNDDDB records for this species across its range, two  
8 of which are located in the study area. One is located in the western most portion of CZ 1 in the  
9 Jepson Prairie area and the other at Cosumnes River Preserve north of I-5 in CZ 4 (California  
10 Department of Fish and Wildlife 2013).

11 ***Curved-Foot Hygrotus Diving Beetle***

12 Curved-foot hygrotus diving beetle, which has a NatureServe conservation status of critically  
13 imperiled, occurs in vernal pools and alkali wetlands in Alameda and Contra Costa Counties  
14 (California Department of Fish and Wildlife 2013; NatureServe 2011b). Vernal pool complexes and  
15 alkali wetlands in the western portions of CZs 7, 8, and 9, and in the eastern portion of CZ 10  
16 represent potential habitat for this species (Figure 12-7). The analysis for this species utilizes the  
17 BDCP's habitat model for vernal pool crustaceans. There are 21 CNDDDB records for this species  
18 across its range. Six of them occur within western portion of the study area north and south of the  
19 city of Brentwood (California Department of Fish and Wildlife 2013).

20 ***Molestan Blister Beetle***

21 Molestan blister beetle, which has a NatureServe conservation status of imperiled, is typically  
22 associated with flowers in dried vernal pools within central California (California Department of  
23 Fish and Game 2006b). Vernal pool complexes and alkali seasonal wetlands in CZ 8 represent  
24 potential habitat for this species in the study area (Figure 12-7). The analysis for this species utilizes  
25 the BDCP's habitat model for vernal pool crustaceans. There are 17 CNDDDB records for this species  
26 across its range. One of these is within the study area and is located near the town of Brentwood in  
27 CZ 9 (California Department of Fish and Wildlife 2013).

28 **Sacramento and Antioch Dunes Anthicid Beetles**

29 Sacramento anthicid beetle, which has a NatureServe conservation status of critically imperiled,  
30 occurs on interior sand dunes (inland dune scrub) and sand bars, and has also been found in dredge  
31 spoil heaps (California Department of Fish and Game 2006c). The species is found in several  
32 locations along the Sacramento and San Joaquin Rivers, from Shasta to San Joaquin Counties, and at  
33 one site along the Feather River at Nicolas (California Department of Fish and Game 2006c). Suitable  
34 habitat within the study area includes the dunes at Antioch Dunes NWR, sand bars along the  
35 Sacramento and San Joaquin Rivers, and sandy dredge spoil piles. There are 13 extant records of  
36 Sacramento anthicid beetle across its range, seven of which occur within the study area (Figure 12-  
37 8) (California Department of Fish and Wildlife 2013).

38 Antioch Dunes anthicid beetle, which also as a NatureServe conservation status of critically  
39 imperiled, occurs on interior sand dunes (inland dune scrub) and sand bars, typically areas that are  
40 unvegetated (California Department of Fish and Game 2006d). The species apparently has been  
41 extirpated from the type locality at Antioch Dunes and has more recently been documented along  
42 the Sacramento River in Glenn, Tehama, Shasta, and Solano Counties, and from one site at Nicolas on

1 the Feather River in Sutter County (California Department of Fish and Game 2006d). Antioch Dunes  
 2 NWR, sand bars along the Sacramento and San Joaquin Rivers provide potential habitat within the  
 3 study area, and possibly sandy, dredge spoil piles. There are five extant records of Antioch Dunes  
 4 anthicid beetle across its range, one of which is within the study area and is just north of Rio Vista  
 5 (Figure 12-9) (California Department of Fish and Wildlife 2013).

6 In the north Delta, three general areas were identified from a 2012 review of Google Earth imagery  
 7 appear to have accumulations of sandy soils (with some vegetation), possibly from dredge disposal,  
 8 are Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island.  
 9 A review of aerial photographs in the south Delta identified sandbar habitat along the San Joaquin  
 10 River from the southern end of the Plan Area downstream to an area just north of its crossing of I-5.  
 11 An additional area along Paradise Cut was identified just north of I-5. These areas could be occupied  
 12 by Sacramento and Antioch Dunes anthicid beetles.

### 13 **Inland Dune Scrub Invertebrate Species**

14 Although the Plan Area contains habitat for the inland dune scrub invertebrate species described in  
 15 this section, BDCP actions would have no effects on inland due scrub invertebrates. Construction  
 16 and operations and maintenance of the water conveyance facilities (CM1) and other conservation  
 17 measures would not affect the species' or their habitat. Therefore, the inland dune scrub  
 18 invertebrate species described here are not addressed in Section 12.3.3, *Effects and Mitigation*  
 19 *Approaches*.

#### 20 ***Lange's Metalmark Butterfly***

21 A federally listed endangered species, Lange's metalmark butterfly is entirely dependent on  
 22 nakedstem buckwheat as its larval host plant and as its primary adult nectar plant. This plant is  
 23 restricted to sandy, well drained soils (U.S. Fish and Wildlife Service 2008). The Antioch Dunes NWR  
 24 has the only known extant populations of Lange's metalmark within the study area (Figure 12-10)  
 25 (U.S. Fish and Wildlife Service 2008). No other suitable habitat for this species has been identified  
 26 within the study area.

#### 27 ***Antioch Efferian Robberfly***

28 Antioch efferian robberfly, which has a NatureServe conservation status ranging from critically  
 29 imperiled to vulnerable, is known only from Contra Costa and Fresno Counties (California  
 30 Department of Fish and Wildlife 2013). Little is known about the species, but it is assumed to occur  
 31 in sand dunes and loose sandy soils (California Department of Fish and Game 2006e, Entomological  
 32 Consulting Ltd. 2005). The inland dune scrub habitat at the Antioch Dunes NWR represents the only  
 33 suitable habitat identified in the study area (Figure 12-10). There are four CNDDDB records of this  
 34 species in California, one of which is within the study area and is located at the Antioch Dunes NWR  
 35 (California Department of Fish and Wildlife 2013).

#### 36 ***Redheaded Sphecic Wasp***

37 Redheaded sphecic wasp, which has a NatureServe conservation status ranging from critically  
 38 imperiled to vulnerable, and ranging from critically imperiled to imperiled in California, nests in  
 39 sand and is known from a few sites in the Delta and foothills of the Central Valley (Entomological  
 40 Consulting Ltd. 2005; California Department of Fish and Wildlife 2013). The Antioch Dunes (the  
 41 species type locality) likely represents the only suitable habitat for this species in the study area

1 (Figure 12-10). There are three CNDDDB records of this species in California, including one within the  
2 study area at the Antioch Dunes NWR (California Department of Fish and Wildlife 2013).

3 ***Middlekauff's Shieldback Katydid***

4 Middlekauff's shieldback katydid, which has a NatureServe conservation status ranging from  
5 critically imperiled to imperiled and a status of imperiled in California, is known only from the  
6 Antioch Dunes and is believed to have lived on various shrubs indigenous to the dunes (California  
7 Department of Fish and Wildlife 2013, Entomological Consulting Ltd 2005). The only CNDDDB record  
8 for this species in California is at the Antioch Dunes (Figure 12-10) (California Department of Fish  
9 and Wildlife 2013).

10 ***Hurd's Metapogon Robberfly***

11 Hurd's metapogon robberfly is known from only two locations, the Antioch Dunes and in Fresno  
12 County, where it is thought to be extirpated (California Department of Fish and Wildlife 2013). The  
13 species, which has a NatureServe conservation status ranging from critically imperiled to  
14 vulnerable, is believed to occur in sand dunes and loose sandy soils (Entomological Consulting Ltd.  
15 2005). The inland dune scrub habitat at the Antioch Dunes NWR represents the only suitable habitat  
16 identified in the study area (Figure 12-10).

17 ***Antioch Mutillid Wasp***

18 Antioch mutillid wasps usually nest in the ground in sandy soils (Entomological Consulting Ltd.  
19 2005). This species, with a NatureServe conservation status of possibly extinct, is known from the  
20 Antioch Dunes, Yolo County and Inyo County (California Department of Fish and Wildlife 2013). The  
21 Antioch Dunes NWR is believed to represent the only habitat for this species in the study area  
22 (Figure 12-10).

23 ***Antioch Andrenid Bee***

24 Antioch andrenid bee, which has a NatureServe conservation status of critically imperiled, occurs in  
25 interior dunes and is currently known only from the Antioch Dunes NWR (California Department of  
26 Fish and Game 2006f; California Department of Fish and Wildlife 2013). The dune habitat at Antioch  
27 Dunes NWR represents the only habitat for this species in the study area (Figure 12-10).

28 ***Antioch Sphecid Wasp***

29 Antioch sphecid wasp, which has a NatureServe conservation status of critically imperiled, occurs in  
30 inland marine sand hills and nests in sandy ground (California Department of Fish and Game  
31 2006g). The species was originally thought to only occur at the Antioch Dunes (where it is thought  
32 to be extirpated) but was more recently found in the Zayante sand hills of Santa Cruz County  
33 (California Department of Fish and Game 2006g; California Department of Fish and Wildlife 2013).  
34 The dune habitat at Antioch Dunes represents the only habitat for this species in the study area,  
35 though, as mentioned previously, it is believed that this population has been extirpated (Figure 12-  
36 10).

37 ***Antioch Dunes Halictid Bee***

38 The Antioch Dunes halictid bee, which has a NatureServe conservation status of critically imperiled,  
39 occurs in sandy habitats and depends on its primary host plant, Antioch Dunes evening primrose

1 (Shepherd 2005). The species is known only from the Antioch Dunes, which is within the study area  
2 (Figure 12-10) (California Department of Fish and Wildlife 2013).

### 3 **Delta Green Ground Beetle**

4 Delta green ground beetle typically occurs on the margins of vernal pools and in bare areas along  
5 trails and roadsides, where individuals often hide in cracks in the mud and under low-growing  
6 vegetation (U.S. Fish and Wildlife Service 2009a). The current known range of this federally listed  
7 threatened species is in the area of Jepson Prairie, generally bound by Travis Air Force Base to the  
8 west, State Route (SR) 113 to the east, Hay Road to the north, and Creed Road to the south (Arnold  
9 and Kavanaugh 2007). Suitable habitat in the study area would be vernal pool complexes and annual  
10 grasslands in the general Jepson Prairie area (Figure 12-11). There are six extant CNDDDB records for  
11 delta green ground beetle throughout its range. One of these records occurs within the study area  
12 within Jepson Prairie along the western edge of CZ 1 (California Department of Fish and Wildlife  
13 2013). This record is actually a compilation of several observations from 1978 to 2002 (California  
14 Department of Fish and Wildlife 2013). This general area is also critical habitat for delta green  
15 ground beetle (45 FR 52807-52810). Portions of the Jepson Prairie Core Recovery Area lie within  
16 the study area. The recovery plan calls for the protection of 100% of the delta green ground beetle  
17 occurrences and 95% of the Jepson Prairie Core Recovery Area (U.S. Fish and Wildlife Service 2005).

### 18 **Callippe Silverspot Butterfly**

19 The callippe silverspot butterfly, which is listed as endangered under ESA, is found in grassy hills  
20 surrounding San Francisco Bay that support the species' native host-plant, Johnny jump-ups.  
21 Suitable habitats are typically in areas influenced by coastal fog with hilltops available for adult  
22 congregation and mating. Preferred nectar flowers used by adults include thistles (blessed milk  
23 thistle, and coyote wildmint. Other native nectar sources include hairy false goldeneaster, coast  
24 buckwheat, mourning bride, and California buckeye. There are five extant records of callippe  
25 silverspot in the CNDDDB (California Department of Fish and Wildlife 2013) for the San Bruno  
26 Mountain population in San Mateo County, and several records for a second population in the  
27 Cordelia Hills in western Solano County, part of which is in CZ 11 in the study area west of I-680  
28 (U.S. Fish and Wildlife Service 2009b). Another area of potential habitat for the species (grassy hills  
29 with Johnny jump-ups) in the study area is Potrero Hills (Figure 12-12). Suitable habitat has been  
30 identified in this general area but the species has not been observed during surveys of portions of  
31 Potrero Hills Solano County 2005; Arnold pers. comm.). There is no critical habitat designated for  
32 this species.

### 33 **California Red-Legged Frog**

34 The California red-legged frog is listed as threatened under ESA and is a California species of special  
35 concern. Pools in perennial and seasonal streams and stock ponds provide potential breeding  
36 habitat for this species. In addition to breeding habitat, the California red-legged frog also requires  
37 upland non-breeding habitat for cover, aestivation, and migration and other movements. Potential  
38 cover habitat consists of all aquatic, riparian, and upland areas that provide cover, such as animal  
39 burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris;  
40 agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay stacks  
41 may also be used (61 FR 25813). Incised stream channels with portions narrower and depths  
42 greater than 18 inches also may provide important summer sheltering habitat (61 FR 25813).  
43 Accessibility to cover habitat is essential for the survival of red-legged frogs within a watershed and



1 can be a factor limiting frog populations. Movement corridors may include annual grasslands,  
2 riparian corridors, woodlands, and sometimes active agricultural lands (Fellers and Kleeman 2007).

3 There are 26 CNDDDB occurrences within the study area (California Department of Fish and Wildlife  
4 2013) (Figure 12-13). There are also 3 non-CNDDDB occurrences for this species in the study area.  
5 Most of the occurrences are west of Clifton Court Forebay (CZs 7 and 8). Three of the occurrences of  
6 California red-legged frog are west of Interstate-680 in CZ 11 and there is an additional occurrence  
7 in a small creek south of Antioch in CZ 10. There are no other reported occurrences in the study  
8 area. The study area represents the extreme eastern edge of the species' coastal range, which  
9 extends westward and southward from the study area border into the grassland foothills of eastern  
10 Contra Costa and Alameda Counties (see BDCP Appendix 2.A, *Covered Species Accounts*).

11 Approximately 2,460 acres of designated critical habitat for the California red-legged frog overlaps  
12 with the study area along the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862  
13 acres of designated critical habitat is also present along the western edge of CZ 8 in critical habitat  
14 unit ALA-2.

15 DHCCP conducted surveys for California red-legged frog from 2009–2011 in Contra Costa County in  
16 CZ 8 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*)  
17 and identified one juvenile and two adult California red-legged frogs near Clifton Court Forebay. Egg  
18 masses and larvae were discovered at another location in the general vicinity of Clifton Court  
19 Forebay. In 2010, four California red-legged frogs were identified at two sites in Contra Costa  
20 County, but no evidence of reproduction was found at these sites. Larvae were found again at the  
21 site where larvae had been identified in 2009, but they were not found at four newly surveyed sites.  
22 California red-legged frog surveys were limited in 2011, with only four new parcels identified with  
23 potential aquatic habitat available. No adult or juvenile California red-legged frogs were observed or  
24 heard, and no larvae were detected during dipnetting at the surveyed locations (Appendix 12C).

### 25 **California Tiger Salamander**

26 California tiger salamander, which is listed as threatened under both ESA and CESA, is endemic to  
27 California. Approximately 80% of the species' original vernal pool habitat has been lost across its  
28 range. California tiger salamander modeled habitat is divided into aquatic habitat, which consists of  
29 vernal pools the species uses for breeding, and terrestrial cover and aestivation habitat, which  
30 consists of grasslands with burrows within 1.24 miles of breeding habitat and where California tiger  
31 salamander live most of the year.

32 There are 20 CNDDDB records from the study area (California Department of Fish and Wildlife 2013).  
33 There is also one non-CNDDDB occurrence for this species in the study area. California tiger  
34 salamander occurs within the study area in CZ 8 west of Clifton Court Forebay and in CZ 11 in the  
35 Potrero Hills (Figure 12-14). Potential habitat exists in vernal pool habitats in Yolo and Solano  
36 Counties (CZs 1, 2, and 3) west of Liberty Island and in the vicinity of Stone Lakes in Sacramento  
37 County (CZ 4). DWR found California tiger salamander west of Clifton Court Forebay in the same  
38 vicinity as several of the CNDDDB (California Department of Fish and Wildlife 2013) records  
39 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).  
40 There is also a small, isolated population near Manteca, south of Highway 120 in CZ 7.

41 Approximately 1,781 acres of designated critical habitat unit 2 (Jepson Prairie Unit) for California  
42 tiger salamander overlap the study area in CZ 1. While this area is located within the Cache Slough  
43 Complex, it is not expected to be affected by BDCP tidal habitat restoration actions.

1 Over 200 vernal pools were surveyed for amphibian species in the vicinity of Clifton Court Forebay  
 2 and Stone Lakes NWR in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
 3 *Environmental Data Report*). No California tiger salamander eggs were found. An additional 28  
 4 vernal pools were surveyed later in the same year in Sacramento, San Joaquin, and Contra Costa  
 5 Counties and no eggs were found. Three larvae were collected in 2009 at one of two sites where  
 6 larval surveys were conducted in Contra Costa County. In 2010, one larva was found in the same  
 7 pool as in 2009. However, no larvae were found in the other four sites surveyed. In 2011, larvae  
 8 were detected at two ponds. One detection corresponded with a 2005 CNDDDB record and the other  
 9 possibly matched with a 1982 record. However, the 2011 surveys were limited to larval dipnetting  
 10 because land access was limited (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
 11 *Environmental Data Report*).

## 12 **Giant Garter Snake**

13 The giant garter snake, which is listed as threatened under both ESA and CESA, resides in marshes,  
 14 ponds, sloughs, small lakes, low-gradient streams, and other waterways, and in agricultural  
 15 wetlands, including irrigation and drainage canals, rice fields, and the adjacent uplands (58 FR  
 16 54053). Habitat requirements are: (1) adequate water during the snake's active season (early-spring  
 17 through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as  
 18 cattails and bulrushes, accompanied by vegetated banks for escape cover and foraging habitat  
 19 during the active season; (3) basking habitat of grassy banks and openings in waterside vegetation;  
 20 and (4) higher elevation uplands for cover and refuge from flood waters during the snake's winter  
 21 dormant season (Hansen and Brode 1980, Hansen 1986; U.S. Fish and Wildlife Service 2012). In  
 22 some rice-growing areas, giant garter snakes have adapted well to vegetated, artificial waterways  
 23 and associated rice fields (Hansen and Brode 1993). The giant garter snake resides in small mammal  
 24 burrows and soil crevices located above prevailing flood elevations throughout its winter dormancy  
 25 period (U.S. Fish and Wildlife Service 2012). Burrows are typically located in sunny exposures along  
 26 south- and west-facing slopes. Occurrence records indicate that giant garter snakes are currently  
 27 distributed in 13 unique population clusters coinciding with historical flood basins, marshes,  
 28 wetlands, and tributary streams of the Central Valley (Hansen and Brode 1980; Brode and Hansen  
 29 1992; U.S. Fish and Wildlife Service 1999). These populations are isolated, without protected  
 30 dispersal corridors to other adjacent populations, and are threatened by land use practices and  
 31 other human activities, including development of wetland and suitable agricultural habitats. USFWS  
 32 recognizes these 13 extant populations (58 FR 54053): Butte Basin, Colusa Basin, Sutter Basin,  
 33 American Basin, Yolo Basin-Willow Slough, Yolo Basin-Liberty Farms, Sacramento Basin, Badger  
 34 Creek-Willow Creek, Coldani Marsh, East Stockton Diverting Canal and Duck Creek, North and South  
 35 Grassland, Mendota, and Burrell-Lanare. These populations extend from Fresno north to Chico and  
 36 encompass 11 counties: Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano,  
 37 Stanislaus, Sutter, and Yolo Counties.

38 There are 42 CNDDDB occurrences for giant garter snake in the study area in CZs 1, 2, 4, and 5 (Figure  
 39 12-15) (California Department of Fish and Wildlife 2013). There are also 9 non-CNDDDB occurrences  
 40 for this species in the study area (Hansen 2006, 2007, 2008, 2009). The study area includes 2 of the  
 41 13 giant garter snake subpopulations identified in the draft recovery plan for this species: the two  
 42 subpopulations are in the Yolo Bypass/Willow Slough (CZ 2) and Coldani Marsh/White Slough (CZ  
 43 4) areas. Recent survey efforts suggest that extant giant garter snake populations continue to persist  
 44 in these two subpopulations (Hansen 2011). While a few isolated records also occur within the  
 45 Sacramento-San Joaquin Delta, surveys conducted since the mid-1980s suggest that much of the

1 Delta is unoccupied or supports few giant garter snakes. There have been recent sightings of giant  
2 garter snake in the vicinity of Little Connection Slough and Empire Tract, approximately 6 miles  
3 southwest of the Coldani Marsh/White Slough area (Hansen pers. comm.). These isolated records  
4 also suggest that while giant garter snakes may have occupied this region at one time, longstanding  
5 reclamation of wetlands for intense agricultural applications has eliminated most suitable habitat  
6 (Hansen 1986) and prohibited the reestablishment of viable giant garter snake breeding  
7 populations.

8 In 2009 DHCCP conducted surveys for giant garter snake in portions of the study area (Appendix  
9 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report). Despite an  
10 intensive survey effort, no giant garter snake were observed or captured. Visual encounter surveys  
11 were conducted on accessible parcels with suitable habitat in 2009 concurrently with either habitat  
12 assessment reconnaissance surveys conducted in April and with trapping surveys conducted from  
13 May through September. Trapping surveys were conducted on 97 parcels where 62 individual trap  
14 lines were set for a total of approximately 42,700 trap-days. No additional trapping surveys for giant  
15 garter snake were conducted in 2010. A limited number of visual encounter surveys were conducted  
16 in spring 2010, and the species was not encountered. Following the 2009 trapping effort, giant  
17 garter snake expert Eric Hansen began independently surveying one trap location 6 weeks after one  
18 of DHCCP's traps had been removed and successfully captured more than one giant garter snake  
19 (Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report).

20 In 2009 and 2010, Eric Hansen (2011) surveyed the Coldani Marsh/White Slough area. Mr. Hansen  
21 captured 27 individual giant garter snakes in the Upland Canal along the west and southwest edges  
22 of the Coldani Marsh, which is an emergent tule marsh (Figure 12-15B). Giant garter snakes were  
23 not captured or observed in any of the ponds or in any of the other emergent tidal marshes at the  
24 White Slough Wildlife Area despite the close proximity and ample connectivity amongst habitats  
25 (Hansen 2011). This might be partially due to the fact that Coldani Marsh differs from other densely  
26 vegetated perennial marsh in the area in that tidal influence is strongly muted and there is limited  
27 access for large aquatic predators such as largemouth and striped bass. Mr. Hansen noted that while  
28 he did not have access to conduct surveys, several locations near the Coldani Marsh and Upland  
29 Canal, including eastern Sycamore Slough, Dredger Cut, and Hog Slough contain promising habitat in  
30 the study area.

### 31 **Western Pond Turtle**

32 The western pond turtle is a California species of special concern primarily found in natural aquatic  
33 habitats. The species inhabits impoundments, irrigation ditches, and other artificial and natural  
34 water bodies (Ernst et al. 1994). Western pond turtle is usually found in stagnant or slow-moving  
35 freshwater habitats and sometimes in brackish habitats (Ernst et al. 1994). The western pond turtle  
36 is uncommon in high gradient streams, most likely due to low water temperatures, rapid current  
37 velocity, and few food resources (Jennings and Hayes 1994).

38 Historically, western pond turtles inhabited most water bodies throughout their range, but the  
39 series of warm, shallow lakes and extensive slough systems that formerly covered most of the floor  
40 of the Central Valley represented their optimal habitat (Jennings et al. 1992). Western pond turtles  
41 are common throughout many parts of the Delta, including island interiors, particularly main  
42 irrigation and drainage canals or ditches, including toe drains. The species has the potential to occur  
43 along most of the slower-moving sloughs and other natural watercourses and in artificial channels

1 and other water bodies in the study area where essential habitat elements (streamside cover, logs  
2 and other debris for basking, and adjacent upland habitats) are present (Figure 12-16).

3 Upland habitats are also important to western pond turtles for nesting, overwintering, and overland  
4 dispersal (Holland 1994). Nesting sites may be 1,312 feet or more from the aquatic habitat, although  
5 usually the distance is much less and generally around 328 feet (Jennings and Hayes 1994).  
6 Dispersal habitat can be up to 1.86 miles from aquatic habitat but is typically less than 0.5 mile  
7 away. Dispersal habitat is similar to upland nesting habitat types but also includes agricultural land.  
8 Grasslands and riparian areas provide western pond turtle upland nesting and overwintering  
9 habitat.

10 There are 62 reported occurrences for western pond turtle throughout the study area in CZs 3–11  
11 (California Department of Fish and Wildlife 2013). DHCCP reported incidental observations for  
12 western pond turtle during surveys for listed shrimp species and giant garter snake, but did not  
13 specify exact locations (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
14 *Environmental Data Report*).

### 15 **Silvery Legless Lizard, San Joaquin Coachwhip and Blainville’s Horned Lizard**

16 These three reptile species are California species of special concern and could occur in suitable  
17 habitat in the study area: silvery legless lizard, San Joaquin coachwhip, and Blainville’s horned  
18 lizard.

19 The silvery legless lizard is associated with a variety of vegetation types on sandy soils with  
20 accessible moisture, primarily, but not exclusively, in semistabilized dunes. The species is  
21 distributed in patches from Antioch southward along the coast, and to the foothills, San Joaquin  
22 Valley, and southern Sierra Nevada. There are seven CNDDDB occurrences in CZ 10, and a probable  
23 extinct occurrence in CZ 9 (California Department of Fish and Wildlife 2013)(Figure 12-17). The  
24 occurrences were reported from 1966 to 2005; several of these may no longer be present because of  
25 development and loss of habitat. One of the occurrences in CZ 10 is associated with inland dune  
26 habitat at the Antioch Dunes NWR and may still be extant. The remaining locations are patchy and  
27 fragmented by roads and development.

28 The San Joaquin coachwhip occurs in open habitats, including grasslands, savannas, open-canopy  
29 scrub, and chaparral, with available rodent burrows for cover. The species ranges across the San  
30 Joaquin Valley and associated foothills to the west and could occur in CZs 7 and 8 in upland habitat  
31 in the southern portion of the study area around Clifton Court Forebay. There are no reported  
32 occurrences in the study area. There are three occurrences within 2–5 miles of the study area west  
33 of CZs 7 and 8 (Figure 12-17) (California Department of Fish and Wildlife 2013). Coachwhips could  
34 be present in grassland and alkali seasonal wetland complex habitats in both of those CZs.

35 The Blainville’s horned lizard is associated with a variety of open habitats, including chaparral, oak  
36 savanna, inland dunes, and grassland. The species is found primarily in areas with sandy, friable  
37 soils, scattered shrubs, and abundant ant colonies (Figure 12-17). The species’ range covers most of  
38 west-central and southwestern California below 8,000 feet elevation. There are 18 occurrences  
39 within 1.3–15 miles of the study area (California Department of Fish and Wildlife 2013). The  
40 Blainville’s horned lizard could occur in the stabilized dunes along the western water facilities  
41 conveyance alignment in CZ 10, in the grasslands near Clifton Court Forebay (CZ 7 and 8), and north  
42 of Stone Lake (CZ 4).

**1 California Black Rail**

2 California black rail, which is listed as threatened under CESA and which is a USFWS bird of  
3 conservation concern and a fully protected species under the Fish and Game Code, inhabits high  
4 elevation areas of tidal saltwater and brackish marshes and freshwater marshes in several areas of  
5 California and isolated locations in western Arizona (Eddleman et al. 1994). Approximately 80% of  
6 the California black rail subspecies resides in the San Francisco Bay (Evens et al. 1991). There are 40  
7 CNDDDB occurrences of California black rail in the study area (Figure 12-18). Most CNDDDB  
8 occurrences within the study area are from Suisun Marsh in CZ 11, though several occurrences have  
9 been reported in the central study area (California Department of Fish and Wildlife 2013). DHCCP  
10 black rail breeding season surveys detected two presumed nest sites in 2009, 24 presumed nest  
11 sites in 2010 and three presumed nest sites in 2011 (Appendix 12C, *2009 to 2011 Bay Delta*  
12 *Conservation Plan EIR/EIS Environmental Data Report*). The majority of presumed breeding rails  
13 were in CZ 6, but rails were also detected in CZs 4, 5, and 9. Natural communities in the study area  
14 containing suitable California black rail habitat are tidal brackish emergent wetland, tidal  
15 freshwater emergent wetland, alkali seasonal wetland complex, and managed wetland. Detailed  
16 information on California black rail can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

**17 California Clapper Rail**

18 California clapper rail, which is listed as endangered under both ESA and CESA and which is a fully  
19 protected species under the Fish and Game Code, is found within the tidal channels and low  
20 elevation areas of salt and brackish marshes of the San Francisco Bay Area. Its distribution within  
21 the study area is restricted to Suisun Marsh in CZ 11 (Figure 12-19). However, tidal freshwater  
22 emergent wetlands west of Highway 160, which lie within CZ 5, may provide some isolated patches  
23 of suitable habitat. There are 14 CNDDDB occurrences of California clapper rail in the study area all in  
24 CZ 11 (California Department of Fish and Wildlife 2013). Detailed information on California clapper  
25 rail can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

**26 California Least Tern**

27 California least tern, which is listed as endangered under both ESA and CESA and which is a fully  
28 protected species under the Fish and Game Code, occurs from the San Francisco Bay Area to the tip  
29 of the Baja California peninsula. There are two CNDDDB occurrences of California least tern in the  
30 study area (California Department of Fish and Wildlife 2013) (Figure 12-20). Nesting has been  
31 reported from two sites within the study area (CZ 11) in Suisun Marsh and at the Pittsburgh  
32 Generating Plant; nesting has also occurred in two other sites just outside the study area boundary.  
33 California least terns nest in loose colonies on barren or sparsely vegetated sandy or gravelly  
34 substrates above the high tide line along the coastline and in lagoons and bays of the California  
35 coast. In the San Francisco Bay Area and Suisun Bay, nesting colonies are typically located in  
36 abandoned salt ponds and along estuarine shores, often using artificially or incidentally created  
37 habitat (Rigney and Granholm 2005; Marschalek 2008). Overall, there is little to no natural nesting  
38 habitat available in the study area. While much of the tidal perennial aquatic habitat (open water) is  
39 suitable for tern foraging, current and any future nesting would be incidental and based on the  
40 availability and suitability of artificial features, such as gravel piles or unused gravel roads in the  
41 immediate vicinity of open water habitats. Suitable foraging habitat for California least tern is any  
42 tidal perennial aquatic habitat.

## 1 **Greater Sandhill Crane**

2 Greater sandhill cranes are winter residents in the study area, arriving during early September,  
3 reaching maximum densities during December and January and departing during early March.  
4 Portions of the study area are used regularly and by large numbers of greater sandhill cranes  
5 (California Department of Fish and Wildlife 2013). Greater sandhill crane is a fully protected species  
6 under the Fish and Game Code and listed as threatened under CESA. These lands make up what is  
7 designated as the greater sandhill crane use area in the greater sandhill crane habitat model (see  
8 BDCP Appendix 2.A, *Covered Species Accounts*). Sandhill cranes primarily forage in harvested row  
9 crops (primarily grains such as corn) and tend to congregate in small to large flocks. In the study  
10 area (Figure 12-21), foraging habitat consists mainly of harvested corn fields, followed by winter  
11 wheat, irrigated pastures, alfalfa fields, and fallow fields (BDCP Appendix 2.A, *Covered Species*  
12 *Accounts*). Mid-day loafing typically occurs in wetlands and flooded fields along agricultural field  
13 borders, levees, rice checks, and ditches, and in alfalfa fields or pastures. Night roosting is in  
14 shallowly flooded open fields and open wetlands interspersed with uplands. Sandhill cranes are  
15 sensitive to human disturbance and only occur in agricultural areas that contain suitable crops  
16 (BDCP Appendix 2.A, *Covered Species Accounts*).

## 17 **Lesser Sandhill Crane**

18 Lesser sandhill cranes do not breed in California but are winter residents and migrants in the study  
19 area, arriving during early September and reaching maximum densities during December and  
20 January and departing during early March (California Department of Fish and Wildlife 2013,  
21 Littlefield 2008). Lesser sandhill crane is a California species of special concern and large numbers  
22 of lesser sandhill cranes use portions of the study area regularly. Sandhill cranes primarily forage in  
23 row crops (primarily grains, such as corn) and tend to congregate in small to large flocks. In the  
24 study area, lesser sandhill crane foraging habitat is consistent with greater sandhill crane (although  
25 the foraging values of crop types differ between the two subspecies) and consists mainly of  
26 harvested corn fields, winter wheat, irrigated pastures, alfalfa fields, and fallow fields (Figure 12-  
27 22). Mid-day loafing typically occurs in wetlands and flooded fields along agricultural field borders,  
28 levees, rice checks, and ditches, and in alfalfa fields or pastures. Night roosting is in shallowly  
29 flooded open fields and open wetlands interspersed with uplands. Sandhill cranes (both greater and  
30 lesser) use similar roost sites and are both sensitive to human disturbance. Lesser sandhill cranes  
31 are less traditional than greater sandhill cranes and are more likely to move between different roost  
32 site complexes and different wintering regions. The wintering range is ten times larger than the  
33 greater sandhill crane's and lesser sandhill crane's average foraging flight radius from roost sites is  
34 twice that of greater sandhill cranes (Ivey pers. comm.).

## 35 **Least Bell's Vireo**

36 Least Bell's vireo is a state and federally endangered riparian obligate species whose potential  
37 habitat within the study area is restricted to the valley/foothill riparian natural community. The  
38 study area represents part of the center of the species' historical range, but least Bell's vireo has  
39 been almost entirely absent from the study area since at least the 1970s due to widespread habitat  
40 loss (Figure 12-23). There is one CNDDB occurrence of Least Bell's vireo in the study area  
41 (California Department of Fish and Wildlife 2013). A recent sighting in April 2010 of two singing  
42 males in the Yolo Bypass Wildlife Area, and a second sighting of least Bell's vireo in the spring of  
43 2011 suggests the species may have the potential to re-establish within the study area. Detailed  
44 information on least Bell's vireo can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

**1 Yellow Warbler**

2 Yellow warbler, California species of special concern and a USFWS bird of conservation concern, is a  
3 riparian obligate species which was once a common breeder in the Central Valley (Riparian Habitat  
4 Joint Venture 2004, Grinnell and Miller 1944). It's potential habitat within the study area is  
5 restricted to valley/foothill riparian habitats. The study area represents part of the center of the  
6 species' historical range. However, the species is largely extirpated as a breeder in the Sacramento  
7 Valley, the Delta and San Joaquin Valley because of widespread habitat loss (Riparian Habitat Joint  
8 Venture 2004). A single breeding pair was recorded in 2002 on the San Joaquin Wildlife Refuge  
9 (south of the study area) and the number of nesting territories has increased each year to 25  
10 territories in 2011 (Dettling et al. 2012). The increase in yellow warbler territories is largely  
11 attributed to the riparian habitat restoration within the refuge. Although there are no confirmed  
12 breeding accounts, the species has been documented in the study area over the breeding season  
13 within the past 10 years (California Department of Fish and Wildlife 2013) (Figure 12-24).

**14 Suisun Song Sparrow**

15 Suisun song sparrow, a USFWS bird of conservation concern and a California species of special  
16 concern, is endemic to the tidal marshes of Suisun Bay. Breeding habitat consists of tidal brackish  
17 emergent wetland and tidal freshwater emergent wetland in the study area west of Sherman Island.  
18 Managed wetlands, low marsh and upland transitional zones for high tide refugia constitute  
19 secondary habitat. Within the study area, the species occupies suitable habitat in the extreme  
20 western Delta and the Suisun Marsh (Figure 12-25). There are 25 CNDDDB extant occurrences of  
21 Suisun song sparrow from this portion of the study area (California Department of Fish and Wildlife  
22 2013). The hypothetical footprint for BDCP conservation activities overlaps with nine of these  
23 occurrences, all within Suisun Marsh in areas subject to tidal habitat restoration. Detailed  
24 information on Suisun song sparrow can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

**25 Saltmarsh Common Yellowthroat**

26 Saltmarsh common yellowthroat is endemic to the greater San Francisco Bay region, with its eastern  
27 limits reaching to Alameda County and Suisun Bay (Gardali and Evens 2008). Breeding habitat  
28 consists of tidal brackish emergent wetland and tidal freshwater emergent wetland in the study area  
29 west of Sherman Island. Managed wetlands, low marsh and upland transitional zones for high tide  
30 refugia constitute secondary habitat. Within the study area, saltmarsh common yellowthroat  
31 occupies suitable habitat in the extreme western Delta and Suisun Marsh (Figure 12-26). The  
32 species is a USFWS bird of conservation concern and a California species of special concern. There  
33 are 17 CNDDDB extant occurrences of saltmarsh common yellowthroat in the study area: 13 in CZ 11  
34 and four in CZ 5 (California Department of Fish and Wildlife 2013). The hypothetical footprint for  
35 BDCP conservation components overlaps with five of these occurrences, all within Suisun Marsh in  
36 areas subject to tidal habitat restoration.

**37 Swainson's Hawk**

38 The Swainson's hawk, listed as a threatened species under CESA, is found in the study area mainly  
39 from early March through mid-September (see BDCP Appendix 2.A, *Covered Species Accounts*). It  
40 tends to nest in large trees, typically along stringers of riparian wooded vegetation, but also in  
41 roadside trees, rows or isolated trees in fields, or along field borders, small groves, farmyards, and  
42 residential rural areas (Estep 2007, 2008). Foraging takes place over the open country, historically  
43 grassland, but today Swainson's hawk forages mostly on irrigated cropland and pastureland. The

1 Swainson's hawk is closely associated with cultivated lands. Most of the study area consists of  
 2 cultivated land and most is considered to have some value as foraging habitat for Swainson's hawk  
 3 (see BDCP Appendix 2.A, *Covered Species Accounts*). However, the habitat value of crop types differ  
 4 widely because of their growth and structure, which influences accessibility by foraging hawks, and  
 5 because of prey abundance. There are 456 CNDDDB occurrences of Swainson's hawk in the study area  
 6 (Figure 12-27) (California Department of Fish and Wildlife 2013). In addition, DHCCP and other  
 7 surveys have detected 306 Swainson's hawk nests in the study area. Detailed information on  
 8 Swainson's hawk can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

### 9 **Tricolored Blackbird**

10 Tricolored blackbirds are a California species of special concern. They are a colonial nesting  
 11 passerine that are largely restricted to California. More than 95% of the California breeding  
 12 population of tricolored blackbirds occurs in the Central Valley (Kyle and Kelsey 2011). There are  
 13 few reported historical nesting records of tricolored blackbirds nesting in the Plan Area (Neff 1937;  
 14 Beedy et al. 1991). However, more recent surveys have documented occasional nesting colonies  
 15 along the fringe of Suisun Marsh, in the Yolo Bypass, and along the southwestern perimeter of the  
 16 Plan Area (see BDCP Appendix 2.A, *Covered Species Accounts*). While breeding colonies are  
 17 uncommon, the Delta is recognized as a major wintering area for the species (Hamilton 2004, Beedy  
 18 2008). Tricolored blackbirds nest colonially in large dense stands of freshwater marsh, riparian  
 19 scrub, and other shrubs and herbs. Foraging habitat consists of grassland, managed wetlands,  
 20 natural seasonal wetlands and diverse cultivated land cover types. Within the study area, modeled  
 21 tricolored blackbird breeding and foraging habitat occur in all conservation zones (Figure 12-28).  
 22 There are three CNDDDB occurrences of tricolored blackbird in the study area; one in CZ 1 and two in  
 23 CZ 7 (California Department of Fish and Wildlife 2013). In addition, there are 48 occurrences from  
 24 other surveys, including DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*  
 25 *EIR/EIS Environmental Data Report*). Detailed information on tricolored blackbird can be found in  
 26 BDCP Appendix 2.A, *Covered Species Accounts*.

### 27 **Western Burrowing Owl**

28 The western burrowing owl is a California species of special concern and a year-round resident of  
 29 the Central Valley and other portions of central California. In the study area, it is found mainly in  
 30 grasslands and pasturelands west of the Sacramento River Deep Water Ship Channel in Yolo and  
 31 Solano Counties, as well as along the study area's western edge from approximately  
 32 Brentwood/Antioch to Tracy (Figure 12-29). Areas with greater densities of burrowing owls are  
 33 mostly uncultivated, are less exposed to ground disturbances, and harbor larger and more stable  
 34 populations of California ground squirrels (see BDCP Appendix 2.A, *Covered Species Accounts*). There  
 35 are 144 CNDDDB occurrences of western burrowing owl in the study area (California Department of  
 36 Fish and Wildlife 2013). In addition, DHCCP surveys and other surveys have documented 27  
 37 occurrences of the species. All nests recorded during DHCCP surveys were in the southwest corner  
 38 of the study area in alkali grassland-scrub habitat that is heavily disturbed, has extensive patches of  
 39 bare ground, and has substantial ground squirrel activity. For more detail on western burrowing  
 40 owl habitat requirements, see BDCP Appendix 2.A, *Covered Species Accounts*.

### 41 **Western Yellow-Billed Cuckoo**

42 Western yellow-billed cuckoo is a riparian obligate species whose habitat within the study area is  
 43 restricted to valley/foothill riparian natural communities. Western yellow-billed cuckoo is proposed



1 for listing as threatened under ESA, a USFWS bird of conservation concern, and listed as endangered  
2 under CESA. The historical distribution of western yellow-billed cuckoo extended throughout the  
3 Central Valley, but the species is now widely extirpated, with less than 1% of suitable habitat  
4 remaining in the Sacramento Valley. The remaining habitat lies between Colusa and Red Bluff.  
5 Several migrating western yellow-billed cuckoo have been spotted within the study area, but most  
6 of the suitable riparian habitat occurs in patches too small to support breeding pairs, and no  
7 confirmed recent breeding records exist. The Riparian Bird Conservation Plan (Riparian Habitat  
8 Joint Venture 2004) suggests that minimum patch size to benefit the species should be  
9 approximately 50–100 acres, with a minimum width of 100 meters. There is one CNDDDB occurrence  
10 of western yellow-billed cuckoo in the study area along the Stanislaus River in the southeastern  
11 corner of the study area (California Department of Fish and Wildlife 2013)(Figure 12-30). In  
12 addition, one occurrence was detected in DHCCP surveys but nesting was not confirmed (Appendix  
13 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). For more detail  
14 on western yellow-billed cuckoo habitat requirements, see BDCP Appendix 2.A, *Covered Species*  
15 *Accounts*.

### 16 **White-Tailed Kite**

17 The white-tailed kite is a fully protected species under the Fish and Game Code and inhabits or uses  
18 low-elevation open grasslands, savannah-like habitats, agricultural areas, wetlands, and oak  
19 woodlands (Dunk 1995). There are seven CNDDDB records of white-tailed kite nests in the study area  
20 (California Department of Fish and Wildlife 2013)(Figure 12-31). In addition, ten nests were  
21 detected during DHCCP surveys; nine in 2009 and one in 2011 (Appendix 12C, *2009 to 2011 Bay*  
22 *Delta Conservation Plan EIR/EIS Environmental Data Report*). Most white-tailed kites nest in the  
23 Sacramento Valley are found in oak and cottonwood riparian forests, valley oak woodlands, or other  
24 groups of trees and are usually associated with compatible foraging habitat consisting of low-  
25 growing, herbaceous vegetation in patches of more than 1,500 square meters (Erichsen et al. 1996).  
26 Pasture and hay crops, compatible row and grain crops, and natural vegetation such as seasonal  
27 wetlands and annual grasslands provide foraging habitat for this species (Erichsen 1995). The  
28 white-tailed kite is excluded from narrow bands of riparian vegetation by Swainson's hawks, and  
29 therefore requires wide patches of nesting habitat where its range overlaps with the Swainson's  
30 hawk. For more detail on white-tailed kite habitat requirements, see BDCP Appendix 2.A, *Covered*  
31 *Species Accounts*.

### 32 **Yellow-Breasted Chat**

33 Yellow-breasted chat is a USFWS bird of conservation concern and a California species of special  
34 concern. Yellow-breasted chat nest and forage in valley/foothill riparian habitat with a thick  
35 understory shrub layer. Details of plant alliances that compose suitable yellow-breasted chat habitat  
36 are provided in BDCP Appendix 2.A, *Covered Species Accounts*. There are no CNDDDB occurrences of  
37 yellow-breasted chat from the study area (California Department of Fish and Wildlife 2013)(Figure  
38 12-32). However, field surveys for the DHCCP documented 13 occurrences in 2009 surveys, nine in  
39 2010, and 29 in 2011 during the breeding season, although no nests were confirmed (Appendix 12C,  
40 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). The National  
41 Audubon Society (2008) also noted pairs of yellow-breasted chat at Liberty Island, Sherman Island  
42 and Piper Slough in the central Delta. The hypothetical footprint for BDCP activities overlaps with  
43 one of the DHCCP (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
44 *Data Report*) occurrences on the north end of Sherman Island, an area subject to tidal habitat  
45 restoration.

## 1 **Cooper's Hawk and Osprey**

2 Cooper's hawk and osprey are species on the CDFW watch list. In California, the year-round range of  
3 the Cooper's hawk includes most of the wooded portions of the state (Polite 2005). Osprey breed  
4 primarily in northern California from the Cascade Range to Lake Tahoe and south to Marin County.  
5 Their year-round range includes the northern and western portions of the Central Valley (Polite  
6 1995). Cooper's hawk and osprey are primarily riparian tree-nesting species, although both species  
7 will also nest on man-made structures or in urban areas. Despite their high frequency of use of man-  
8 made structure for nest sites, osprey rely on fish for 99% of their diet; therefore, osprey tend to nest  
9 in close proximity to water (Poole et al. 2002). While Cooper's hawk nest in dense stands of riparian  
10 forest (Polite 2005), osprey prefer more open stands or nest platforms (Poole et al. 2002). Within  
11 the study area, suitable Cooper's hawk and osprey nesting habitat exists in all conservation zones  
12 and consists of valley/foothill riparian habitat with an overstory component (Figure 12-33). There  
13 are no CNDDDB occurrences of Cooper's hawk or osprey nesting in the study area (California  
14 Department of Fish and Wildlife 2013. During DHCCP surveys (Appendix 12C, 2009 to 2011 Bay  
15 Delta Conservation Plan EIR/EIS Environmental Data Report), observers recorded one Cooper's  
16 hawk nesting territory in CZ 5 (although no nest was found) and three osprey nest sites at the south  
17 end of CZ 2. Two of the osprey nests were found, both on towers or poles.

## 18 **Golden Eagle and Ferruginous Hawk**

19 Golden eagle is a USFWS bird of conservation concern and is fully protected under the CDFW code.  
20 Ferruginous hawk is a USFWS bird of conservation concern. Golden eagles nest primarily on cliffs  
21 and hunt in nearby open habitats, such as grasslands, oak savannas, and open shrublands (Grinnell  
22 and Miller 1944) although trees are also used for nesting. There is limited suitable nesting habitat  
23 for golden eagles in the study area and there are no records of nesting with the exception of one  
24 CNDDDB occurrence on the western border of CZ 11 (California Department of Fish and Wildlife  
25 2013). Ferruginous hawks do not breed in California and there is no suitable nesting habitat in the  
26 study area. However, suitable foraging habitat occurs throughout the entire study area for both  
27 golden eagle and ferruginous hawk. The primary foraging habitat for golden eagle and ferruginous  
28 hawk is open, dry grassland habitats (Polite and Pratt 1999, Bechard and Schmutz 1995), but also  
29 includes similar cultivated lands such as grain and hay crops, recently plowed fields, and pastures  
30 (Figure 12-34). Three CNDDDB ferruginous hawk wintering occurrences have been recorded in the  
31 study area— one each in CZs 4, 8, and 11 (California Department of Fish and Wildlife 2013).

## 32 **Cormorants, Herons, and Egrets**

33 Tree-nesting waterbirds, specifically, double-crested cormorant, great blue heron, great egret,  
34 snowy egret, and black-crowned night heron, typically use rookeries (colonial nest sites) that often  
35 include interspecies nesting with other species in this group. These species have high fidelity to nest  
36 sites and, while most species need mature, riparian trees, rookeries for black-crowned night heron  
37 have also been located in riparian scrub (Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan  
38 EIR/EIS Environmental Data Report). Within the study area, suitable riparian habitat for rookeries  
39 occurs primarily along or within the Delta's rivers and sloughs on mid-channel islands (Figure 12-  
40 35) (Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report).  
41 CNDDDB records showed occurrences of rookeries for double-crested cormorant (three in CZ 4 and  
42 one in CZ 5), great blue heron (one in CZ 4 and one in CZ 5) and great egret (both in CZ 4) in the  
43 study area (California Department of Fish and Wildlife 2013). In addition, DHCCP surveys conducted  
44 in 2009, observed cormorant, heron, and egret rookeries throughout the Delta. Eight double-crested

1 cormorant rookeries (representing more than 300 individuals) were detected throughout the Delta  
 2 in riparian trees. All but one of the rookeries were located on instream islands or existing preserves.  
 3 Six were adjacent to marsh, one was adjacent to grassland/scrub, and one was adjacent to alkali sink  
 4 habitat. DHCCP surveyors also observed 19 great blue heron rookeries (representing more than 263  
 5 individuals) in riparian trees adjacent to sloughs, rivers, or marshes throughout the Delta. Eleven of  
 6 the rookeries were on instream islands, six were adjacent to marsh complexes, and two were  
 7 adjacent to grasslands/scrub habitat. Of the eight rookeries not found on instream islands, six were  
 8 on preserved lands. Eleven great egret rookeries (representing at least 271 individuals) were all  
 9 recorded in riparian trees throughout the Delta. Six rookeries were found in marsh complexes, three  
 10 on instream islands, one along a slough in alkali sink scrub habitat, and one was in a farm complex  
 11 (adjacent to an apparent marsh/slough remnant). All six rookeries adjacent to marsh were on  
 12 preserved lands. Four snowy egret rookeries (representing eight individuals) were detected in the  
 13 north Delta in riparian trees on preserved lands adjacent to or in marsh complexes. None were  
 14 observed nesting on instream islands. Four black-crowned night heron rookeries (representing 12  
 15 herons) were also detected. Two were located in riparian scrub in the south Delta near Clifton Court  
 16 Forebay. The other two were located in riparian trees north and south of Walnut Grove.

### 17 **Short-Eared Owl and Northern Harrier**

18 Short-eared owl and northern harrier are marsh-associated ground nesting birds and are both  
 19 California species of special concern. In California, the short-eared owl occurs either as a resident or  
 20 as a winter visitor. The breeding range is patchily distributed throughout the state, including  
 21 portions of the Sacramento and San Joaquin Valleys, northeastern California, and a few scattered  
 22 coastal sites (Roberson 2008). The northern harrier is a year-round resident in California and its  
 23 breeding range covers northern California, the central valley, the central coast, and portions of  
 24 southern deserts (Davis and Niemela 2008). Breeding and foraging habitat for short-eared owl and  
 25 northern harrier in the study area includes wetland natural communities, grasslands, and grassland-  
 26 like cultivated lands such as pastures and alfalfa fields (Figure 12-36). There is one CNDDDB  
 27 occurrence of short-eared owl in the study area, in CZ 11 (California Department of Fish and Wildlife  
 28 2013). Grizzly Island in Suisun Marsh supports the only known breeding population of short-eared  
 29 owl in the study area, although small numbers have been documented episodically at the Cosumnes  
 30 River Preserve and in Byron in Contra Costa County. DHCCP surveyors did not detect short-eared  
 31 owl nesting in the central Delta. There are no CNDDDB occurrences of northern harrier in the study  
 32 area (California Department of Fish and Wildlife 2013). However, northern harrier nests were  
 33 detected during DHCCP surveys (20 nests in 2009, 5 nests in 2010, and 15 nests in 2011; Appendix  
 34 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*), and there is  
 35 suitable nesting and foraging habitat throughout the study area. No nesting northern harriers were  
 36 observed in the north Delta during DHCCP surveys, although individuals were commonly observed  
 37 there throughout the nesting season.

### 38 **Redhead, Tule Greater White-Fronted Goose, and Cackling (Aleutian Canada) Goose**

39 Redhead is a California species of special concern. The year-round range of redhead includes the  
 40 Central Valley, northeastern California and Southern California. Suitable breeding habitat for  
 41 redhead in the study area is in managed wetlands and nontidal freshwater emergent wetlands  
 42 (Beedy and Deuel 2008, Granholm 2008, Figure 12-37). Redhead nests were not detected during  
 43 DHCCP surveys (2009–2011), nor are there any CNDDDB occurrences of breeding redhead in the  
 44 study area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*  
 45 *Report*; California Department of Fish and Wildlife 2013). However, small numbers of redhead nest

1 in private duck clubs and public refuges where summer water levels are greater than 1 meter deep  
 2 (Beedy and Deuel 2008). The Tule greater white-fronted goose is a California species of special  
 3 concern. The nesting range is in southern Alaska, but the species winters in the Central Valley,  
 4 primarily in the Sacramento, Delevan and Colusa NWRs in the Sacramento Valley, in addition to duck  
 5 clubs and rice fields in the Sacramento Valley and Suisun Marsh (Duel and Takekawa 2008). Impact  
 6 analysis for these species is discussed within the shorebirds and waterfowl sections, in Impacts BIO-  
 7 178 through BIO-183.

### 8 **Mountain Plover**

9 The mountain plover is a California species of special concern, a USFWS bird of conservation  
 10 concern and is proposed threatened under ESA. The Central Valley is one of a few key wintering  
 11 areas for the Mountain Plover (Hickey et al. 2003). Suitable habitat for mountain plover includes  
 12 heavily grazed grassland, short hay crops such as alfalfa, freshly tilled fields, and alkali flats (Knopf  
 13 and Rupert 1995; Hunting and Edson 2008). There are two CNDDDB occurrences of mountain plover  
 14 in the west tail of the study area along Flannery Road and this is a traditional wintering area for the  
 15 species. Suitable habitat exists in all conservation zones, and there are records of mountain plover  
 16 outside of the study area adjacent to CZ 1 (Figure 12-38) (California Department of Fish and Wildlife  
 17 2013).

### 18 **Black Tern**

19 Black tern is a California species of special concern that historically bred in freshwater marshes and  
 20 in the Central Valley. Their current breeding range overlaps with the northern tip of the study area,  
 21 and suitable nesting habitat for black tern includes rice fields, flooded cultivated lands, and short  
 22 emergent wetlands (Shuford 2008). Although, there are no confirmed CNDDDB occurrences of  
 23 breeding black tern in the study area (California Department of Fish and Wildlife 2013), the species  
 24 has been documented in rice fields in the Sacramento Valley and Yolo Basin. Suitable nesting habitat  
 25 for black tern in the study area consists of rice fields in CZ 2 (Figure 12-39).

### 26 **California Horned Lark and Grasshopper Sparrow**

27 The grasshopper sparrow is a California species of special concern. The species breeding range in  
 28 California is fragmented throughout the state west of the Cascade-Sierra Nevada Crest (Dobkin and  
 29 Granholm 2008, Vickery 1996). The species nest in shorter, moderately grazed open grasslands but  
 30 have also been recorded in grassland-like cultivated lands such as alfalfa (Unitt 2008, Grinnell and  
 31 Miller 1944). In the Central Valley, loss of native and nonnative grassland through agriculture and  
 32 urbanization have further fragmented grasshopper sparrow's patchy breeding distribution (Unitt  
 33 2008).

34 The CNDDDB reports one occurrence of grasshopper sparrow in the study area, in CZ 11 (California  
 35 Department of Fish and Wildlife 2013) (Figure 12-40). In addition, five active grasshopper sparrow  
 36 nests were detected during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay Delta  
 37 Conservation Plan EIR/EIS Environmental Data Report*). The California horned lark is on the CDFW  
 38 watch list. The year-round range of the California horned lark encompasses the majority of the state  
 39 west of the Cascade-Sierra Nevada Crest (Green 2007) and it is common to abundant in open  
 40 grasslands and similar habitats including alfalfa, fallow fields and pastures. Suitable breeding habitat  
 41 for California horned lark exists throughout the study area, particularly in the western tail and in the  
 42 alkali sink habitat in the study area's southern portion (Figure 12-40).

### 1 **Least Bittern and White-Faced Ibis**

2 Least bittern is a California species of special concern and a USFWS bird of conservation concern.  
3 The white-faced ibis is on the CDFW watch list. There are no CNDDDB occurrences of breeding least  
4 bittern or white-faced ibis in the study area (Figure 12-41) (California Department of Fish and  
5 Wildlife 2013). However, there are recent breeding season records of least bittern near Freeport (CZ  
6 4), in the Yolo Bypass (CZ 2), and on Joice Island in Suisun Marsh (CZ 11) (Sterling 2008). In  
7 addition, there was one unconfirmed breeding least bittern occurrence in the Stone Lakes NWR  
8 during 2010 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
9 *Environmental Data Report*). Breeding white-faced ibis have been recorded in the Yolo Bypass  
10 Wildlife Area (CZ 2), but are not expected to breed in the remainder of the study area (Figure 12-  
11 41). Freshwater and brackish marshes with tall emergent vegetation and managed wetlands  
12 (Sterling 2008) in the northern part of the Plan Area (limited to CZ 2, CZ 4, and CZ 11) provide  
13 suitable breeding habitat for least bittern whereas white-faced ibis breeding habitat is limited to  
14 freshwater emergent and managed wetlands (Granholm 2005).

### 15 **Loggerhead Shrike**

16 The loggerhead shrike is a California species of special concern and a USFWS bird of conservation  
17 concern. Loggerhead shrikes use a variety of open grasslands across their range, including  
18 grasslands, desert scrub, shrub-steppe, and open savannah (Yosef 1996). Loggerhead shrikes nest in  
19 shrubs and trees surrounded by open habitat. In the Central Valley, loggerhead shrikes show a  
20 positive association with grasslands, irrigated pasture, and grain and hay crops (Pandolfino and  
21 Smith 2012) but have also been detected in alkali seasonal wetland (Figure 12-42). Loggerhead  
22 shrikes in the Central Valley were shown to have neither a positive or negative association with row  
23 crops (Pandolfino and Smith 2012). However, because so little is known about the species in  
24 California, these were included as low-value habitat because they may provide foraging  
25 opportunities for loggerhead shrike. There are two CNDDDB occurrences of loggerhead shrike in the  
26 study area: one in CZ 7 and one in CZ 9 (California Department of Fish and Wildlife 2013). In  
27 addition, 10–15 active loggerhead shrike nests were detected during DHCCP surveys in 2009 and  
28 2011, respectively around the Clifton Court Forebay in CZ 8 (Appendix 12C, *2009 to 2011 Bay Delta*  
29 *Conservation Plan EIR/EIS Environmental Data Report*).

### 30 **Song Sparrow “Modesto” Population**

31 Song sparrow “Modesto” population (hereafter referred to as Modesto song sparrow), is ubiquitous  
32 in the Delta and nests throughout the study area. The Modesto song sparrow, a state species of  
33 special concern, was a valid subspecies until 2001 and may be again after additional taxonomic  
34 analysis (Gardali 2008). The population is endemic to the north-central portion of the Central Valley  
35 and the Bay-Delta is one of two areas with the highest population densities. There are no CNDDDB  
36 records of Modesto song sparrow in the study area. However, surveyors detected more than 2,000  
37 occurrences during DHCCP surveys in 2009, 2010, and 2011 (Appendix 12C, *2009 to 2011 Bay Delta*  
38 *Conservation Plan EIR/EIS Environmental Data Report*). Little is known about the specific habitat  
39 requirements for the Modesto song sparrow (Gardali 2008). However, emergent marsh and riparian  
40 scrub provide breeding habitat (Grinnel and Miller 1944, Figure 12-43), In addition, the species has  
41 been observed to nest in valley oak riparian forests with a dense blackberry understory, vegetated  
42 irrigation canals and levees, and recently planted Valley Oak restoration sites (Gardali 2008).

## 1 **Bank Swallow**

2 The bank swallow is a threatened species under CESA. Bank swallows are a colonial-breeding  
3 migrant, arriving in California in mid-March and departing for their wintering grounds by August  
4 (California Department of Fish and Game 1992, Garrison 2004). Approximately 75% of the breeding  
5 population in California occurs along the Sacramento and Feather Rivers, upstream of the Plan Area  
6 where nesting habitat is threatened by flood control and bank protection (California Department of  
7 Fish and Game 1992). Bank swallows require fine textured sandy soils and create their burrows in  
8 vertical banks along rivers, streams, or other water. The species is dependent on bank erosion from  
9 high winter river flows to create suitable burrow substrate (Garrison 1999, Garrison 2004, Moffat et  
10 al. 2005). There are three CNDDDB records of bank swallow colonies in the study area, two at the  
11 northern end of the study area in CZ 2 (one colony with an estimated 120 burrows, and one colony  
12 with an estimated 20 burrows), and one on Brannan-Andrus Island in CZ 5 with unknown colony  
13 size (California Department of Fish and Wildlife 2013). DHCCP surveys for bank swallow were  
14 conducted in selected areas within the Plan Area during 2008, but suitable habitat for bank swallow  
15 was not encountered and no bank swallows were detected (Appendix 12C, *2009 to 2011 Bay Delta  
16 Conservation Plan EIR/EIS Environmental Data Report*). There is little to no other nesting habitat  
17 available in the study area (Figure 12-44). The majority of potential habitat for bank swallow in the  
18 study area is covered in rip rap for bank stabilization, or is made of unsuitable substrate for bank  
19 swallow colonies to form.

## 20 **Yellow-Headed Blackbird**

21 Yellow-headed blackbird is a California species of special concern. Within the study area, suitable  
22 yellow-headed blackbird breeding habitat includes freshwater emergent wetlands, while associated  
23 foraging habitat includes irrigated pastures and alfalfa fields (Twedt and Crawford 1995, Jamarillo  
24 2008, Figure 12-45). There are two CNDDDB occurrences from the 1800s of yellow-headed blackbird  
25 in the study area; one in CZ 7, which is no longer freshwater marsh habitat, and one in CZ 3  
26 (California Department of Fish and Wildlife 2013). In addition, four confirmed yellow-headed  
27 blackbird occurrences were detected in the south central Delta during 2009 and 2010 DHCCP  
28 surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data  
29 Report*) but breeding was not confirmed for the species.

## 30 **Riparian Brush Rabbit**

31 The riparian brush rabbit, which is listed as endangered under both ESA and CESA, is a riparian  
32 obligate species found in association with a dense shrub layer typically located under an open  
33 canopy of valley oaks (Williams et al. 2008). Brush rabbits are dependent on brushy understory  
34 cover for protection and use tunnels beneath dense vegetation to avoid predators (Orr 1940,  
35 Chapman 1971). Populations of the riparian brush rabbit are known to have occurred historically in  
36 riparian forests along the San Joaquin and Stanislaus Rivers and some tributaries to the San Joaquin  
37 River (U.S. Fish and Wildlife Service 1998). As a result of habitat loss and fragmentation, the species  
38 has since been reduced to populations in only two areas: an approximately 258-acre patch in  
39 Caswell Memorial State Park on the Stanislaus River, immediately southwest of the study area; and  
40 several small, isolated or semi-isolated patches totaling approximately 270 acres along Paradise Cut  
41 and Tom Paine Slough and channel of the San Joaquin River in the south Delta, within CZ 7 in the  
42 study area (Figure 12-46) (Williams et al. 2002 and 2008). Recently, on October 11, 2012, a single  
43 female riparian brush rabbit was captured near Durham Ferry Road in riparian habitat along the  
44 San Joaquin River between Caswell MSP and Lathrop (Bradbury pers. comm.). This is only the 2<sup>nd</sup>

1 naturally occurring population documented outside of Caswell MSP. The study area consists of a  
2 large proportion of the species' total range (see BDCP Appendix 2.A, *Covered Species Accounts*).

3 DWR conducted surveys for both the riparian brush rabbit and riparian woodrat (described below)  
4 in the Plan Area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
5 *Data Report*) during 2008 and 2009. A total of 296 parcels were surveyed over the three field  
6 seasons, but neither species was captured during three seasons of trapping. Access restrictions  
7 limited the number of sites with high-value habitat available for survey. From intensive field work in  
8 the Stewart Tract area (since 1998) and in other nearby areas (Caswell Memorial State Park,  
9 Buffington Tract, Faith Ranch, San Joaquin River NWR) over the past 10–30 years, there is every  
10 reason to believe that one or both species are also present in similar habitat at the southern end of  
11 the study area. Populations of riparian brush rabbit are present in these more southern areas of the  
12 study area, where the California State University, Stanislaus, Endangered Species Recovery Program  
13 and its federal and state partner agencies have initiated a captive propagation and reintroduction  
14 program for the species using breeders from the Stewart Tract area. In addition, since 2003, 30  
15 woodrats have been captured at the San Joaquin River NWR and many more have been captured at  
16 Caswell Memorial State Park. It is believed that there is a greater probability of documenting  
17 riparian brush rabbit and perhaps riparian woodrat in areas south of SR 4 and SR 12 (mostly in San  
18 Joaquin County) than in central and northern parts of the study area; however, these species could  
19 be present in the central and northern parts of the study area.

#### 20 **Riparian Woodrat**

21 The riparian woodrat, which is listed as endangered under ESA and as a California species of special  
22 concern, is a riparian obligate species whose typical habitat includes a canopy of valley oak and a  
23 moderate to dense shrub understory with abundant dead branches and downed woody material  
24 (Williams 1986).

25 There are three extant CNDDDB riparian woodrat occurrences in the species' range, none of which are  
26 in the study area (California Department of Fish and Wildlife 2012). The current known range of the  
27 species is confined to a small area in northern San Joaquin County immediately south of the study  
28 area, with the nearest known extant CNDDDB occurrence approximately 1.5 to 2 miles to the  
29 southeast of CZ 7, in Caswell State Park (Figure 12-47). An additional extant population might occur  
30 just outside the study area, near Vernalis along the San Joaquin River, although there have been no  
31 sightings of the species at this location since the 1970s (Williams and Kilburn 1992). Based on the  
32 proximity of these occurrences, the riparian woodrat potentially occurs in suitable habitat in the  
33 study area, in CZ 7, or could occupy this area in the future (see BDCP Appendix 2.A, *Covered Species*  
34 *Accounts*). See riparian brush rabbit discussion above for information on DHCCP survey results for  
35 riparian woodrat and potential for occurrence in the study area.

#### 36 **Salt Marsh Harvest Mouse**

37 Salt marsh harvest mouse is endemic to salt marshes of San Francisco, San Pablo, and Suisun Bays.  
38 Salt marsh harvest mouse, which is listed as endangered under both ESA and CESA and which is a  
39 fully protected species under the Fish and Game Code, is found primarily in tidal brackish emergent  
40 wetlands dominated by pickleweed. The species is also known to use areas of managed wetland. In  
41 Suisun Marsh it is known to use areas of tidal wetlands and managed wetland. Areas containing  
42 mixed wetland vegetation appear to be just as preferable to salt marsh harvest mouse as areas  
43 dominated by pickleweed (Sustaita et al 2011). The species also requires escape cover during high  
44 tides, which has been modeled as upland habitat within 150 feet of the wetted edge, which may

1 include areas of grassland, valley/foothill riparian and some areas mapped as alkali seasonal  
2 wetlands. The species distribution within the study area is thought to extend from Suisun Marsh  
3 eastward along the northern edge of the Sacramento River and eastward along the southern edge of  
4 the San Joaquin River as far east as the vicinity of Collinsville and Antioch west of Sherman Island  
5 (LSA Associates 2007) (Figure 12-48). There are 137 extant records for salt marsh harvest mouse  
6 across its range, 48 of which occur within the study area (California Department of Fish and Wildlife  
7 2013).

### 8 **San Joaquin Kit Fox**

9 The San Joaquin kit fox, which is listed as endangered under ESA and threatened under CESA, is  
10 restricted to modeled grassland habitat along the study area's southwestern edge in CZs 7-10. The  
11 study area represents the extreme northeastern corner of the species' range in California, which  
12 extends westward and southward from the Plan Area border. The northern range of the San Joaquin  
13 kit fox (including the study area) was most likely marginal habitat historically and has been further  
14 degraded due to development pressures, habitat loss, and fragmentation (Clark et al. 2007a).  
15 CNDDDB (California Department of Fish and Wildlife 2013). reports twelve occurrences of San  
16 Joaquin kit foxes along the extreme western edge of the Plan Area within CZ 8, south of Brentwood  
17 (Figure 12-49). However, Clark et al. (2007b) provide evidence that a number of CNDDDB  
18 occurrences in the northern portion of the species' range may be coyote pups misidentified as kit  
19 foxes. Smith et al. (2006) suggest that the northern range may possibly be a population sink for the  
20 San Joaquin kit fox.

21 In the vicinity of the study area, San Joaquin kit foxes inhabit grazed grasslands and grasslands with  
22 associated wind farms. The species also sometimes occurs adjacent to and forages in tilled and  
23 fallow fields and irrigated row crops (Bell 1994). Remaining patches of northern hardpan vernal  
24 pool, northern claypan vernal pool, alkali meadow, and alkali playa types also provide foraging  
25 habitat when in association with grasslands or other suitable denning habitats.

26 Dens are typically in relatively flat terrain or in gently sloping hills, washes, drainages, and roadside  
27 berms. Occupied habitats are usually associated with loose-textured soils to facilitate den  
28 construction (Grinnell et al 1937, Egoscue 1962, Morrell 1972). Shallow soils with close proximity to  
29 bedrock, soils with high water tables, and impenetrable hardpan layers are generally avoided  
30 (Morrell 1972, O'Farrell and Gilbertson 1979, O'Farrell et al. 1980, McCue et al. 1981). Kit foxes will  
31 also modify burrows dug by other animals, such as California ground squirrel.

### 32 **Suisun Shrew**

33 Suisun shrew, a California species of special concern, is typically found in dense, low-lying  
34 vegetation in tidal marshes. It uses adjacent upland habitats as refugia during prolonged flooding.  
35 Suisun shrew is currently found along the northern borders of San Pablo and Suisun bays and in  
36 Suisun Marsh, Southampton Marsh, the Napa Marshes, and as far east as Grizzly Island (Figure 12-  
37 50). The species distribution in the study area is limited to the general Suisun Marsh area and its  
38 modeled habitat in the Plan Area consists of tidal brackish emergent wetland and grassland areas  
39 within 150 feet of the wetted edge. There are 15 extant records for Suisun shrew across its range, six  
40 of which occur within the study area (California Department of Fish and Wildlife 2013).



## Special-Status Bat Species

There is potential for at least thirteen different bat species to be present in the study area (Figure 12-51), including four California species of special concern and nine species ranked from low to moderate priority by the Western Bat Working Group (1998) (Table 12A-2 in Appendix 12A, *Special-Status Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats. No surveys were conducted in 2010. With the availability for access to new parcels, additional habitat assessments were conducted in 2011. The results are summarized briefly below (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report* for details on methods and results, and Table 12A-2 in Appendix 12A).

DHCCP positively identified nine special-status bat species and detected potential calls of two additional special-status bat species (pallid bat and canyon bat) that could not be confirmed with 90% confidence (Table 12-5). Two other bats, the western mastiff bat and Townsend's big-eared bat, were not detected during the DHCCP surveys but have potential to occur in the study area.

**Table 12-5. Bat Species Identified from Acoustic Monitoring at 20 Locations in 10 Habitat Types**

Habitat Type	Number of Parcels (N)	Species of Special Concern		Common Species									Total Bat Species (Confirmed and Potential)
		Western Red	Pallid	Yuma Myotis	California Myotis	Canyon Bat	Western Small-Footed Myotis	Little Brown Myotis	Big Brown	Silver-Haired	Hoary	Mexican Free-Tailed	
Grassland/Disturbed	3	P <sup>a</sup>		X <sup>b</sup>				X	X		X	X	6
Grassland/Riparian Scrub	1			X	X		X	X	X			X	6
Agriculture	3	X		X	P	P	P	X	X		X	X	9
Vineyard	1	X	P	X	X	P		X	P	P	X	X	10
Residential	1	X		X	X		X	X	X	P	P	X	9
Orchard	1	X	P	P	X	P	X		P		X	X	9
Riparian Forest	5	X		X	X	P	X	X	X	P	X	X	10
Oak Forest with Slough	2	P		X	X	P	X	X	X	P	P	X	10
Wetland	2	X		X	X		X	X	X		X	X	8
Eucalyptus	1	X	P			P		X		X	X	X	7

Source: Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report

<sup>a</sup> Potential call of this species but lacks species-distinguishing characteristics.

<sup>b</sup> Confirmed bat species with at least 90% confidence.

X = confirmed

P = potential

The majority of the parcels assessed during 2009 and 2011 contained bat foraging and roosting features and were considered highly suitable habitat. Nearly all of the highly suitable parcels contained wetlands, channels, sloughs, ponds, or irrigation ditches associated with agricultural land

1 uses. Nearly all of the highly suitable parcels also contained large trees, buildings, barns, or sheds  
 2 that could support roosting bats. At the time of the 2009 field surveys, evidence of bat presence  
 3 (bats, guano, urine staining, odor, or vocalizations) was observed on the undersides of 32 of the 145  
 4 existing bridges in the study area. Bats were observed under six of the bridges including four  
 5 bridges with Mexican free-tailed bats and two bridges with unidentified bat species. One of the  
 6 bridges, over the Yolo Causeway, was used by approximately 10,000 Mexican free-tailed bats,  
 7 indicating a maternity roost. A second roost site of about 50 unidentified species was observed  
 8 under a bridge in eastern Solano County. Surveyors found guano that was segmented at two  
 9 potential night roost locations underneath concrete box beam bridges that spanned large flowing  
 10 waterways. Segmented guano could indicate the presence of Townsend's big-eared bat, which was  
 11 not confirmed. Neither of these bridges would provide day or maternity roosting for Townsend's  
 12 big-eared bats.

### 13 **Bat Species Detected in the Study Area**

- 14 ● **Big brown bat:** Occurs throughout California. Roosts opportunistically in buildings, bridges,  
 15 palm thatch, snags, tree hollows and in rock crevices. Forages over wide range of habitats. This  
 16 species was detected in the Plan Area in 2009 (Appendix 12C, *2009 to 2011 Bay Delta*  
 17 *Conservation Plan EIR/EIS Environmental Data Report*).
- 18 ● **California myotis:** Roosts alone or in small groups in crevices and cavities in trees and rocks;  
 19 occasionally roosts in human structures. Maternity colonies of up to 52 individuals have been  
 20 documented in large snags and under tree bark. Forages over a variety of habitats, including arid  
 21 habitats, open lands, forest canopies, forest margins, and water. This species was detected in the  
 22 Plan Area in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
 23 *Environmental Data Report*).
- 24 ● **Hoary bat:** Ranges widely, but populations in the Central Valley are most likely migratory, not  
 25 reproductive. Typically roosts alone in a variety of broadleaf tree species such as cottonwood  
 26 and sycamore; also found roosting in conifers. May be found in a range of vegetation and roost  
 27 substrates during migration. This species was detected in the Plan Area in 2009 (Appendix 12C,  
 28 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Documented  
 29 occurrence during migration in the Montezuma Hills, adjacent to study area (Sacramento  
 30 Municipal Utility District 2010). There are four CNDDDB (2013) recorded occurrences.
- 31 ● **Little brown myotis:** Roosts opportunistically in a variety of structures from trees to buildings.  
 32 Forages in a range of habitats, but typically over water. Likely fall latitudinal or elevational  
 33 migrant to colder areas with caves of suitable temperature regime for hibernation. This species  
 34 was detected in the Plan Area in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*  
 35 *EIR/EIS Environmental Data Report*).
- 36 ● **Mexican free-tailed bat:** Roosts in large colonies in bridges and buildings in the Central Valley;  
 37 breeding colonies may be concentrated in relatively few sites. Also roosts in caves, rock crevices,  
 38 mines and tunnels. Forages over a range of habitats. One of the larger known breeding colonies  
 39 in California occurs under the I-80 bridge in the Yolo Bypass. This species was detected in the  
 40 Plan Area under four bridges 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*  
 41 *EIR/EIS Environmental Data Report*).
- 42 ● **Silver-haired bat:** Typically roosts in tree cavities, crevices and under loose bark. May also use  
 43 leaf litter, buildings, mines and caves. Breeds in coastal and montane coniferous forests, valley  
 44 foothill woodlands, pinyon-juniper woodlands, and valley foothill and montane riparian

1 habitats; may occur in any habitat during migration. Breeding range does not include the Delta,  
 2 which lacks suitable habitat; only a few scattered breeding locations are known in the San  
 3 Francisco Bay Area, Central Valley, or central coast, all outside of the legal Delta. May occur  
 4 throughout California during migration. This species was detected in the Plan Area in 2009  
 5 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).  
 6 Documented occurrence in the Montezuma Hills, adjacent to the study area (Curry et al. 2010).

- 7 ● **Western red bat:** Historically used old-growth riparian habitat. Highly tied to riparian  
 8 vegetation for all life stages. Red bats use riparian and associated habitat (orchards) for all of  
 9 their life stages, including roosting and feeding in riparian zones. Mature riparian broadleaf  
 10 forest in the Central Valley is primary summer breeding habitat for the species in California  
 11 (females and pups). Riverside orchards may also be used as maternity roosts. Roosts alone or in  
 12 small family groups in tree foliage and occasionally in shrubs; prefers habitat edges and mosaics  
 13 with trees that are protected from above and open below with open areas for foraging, including  
 14 grasslands, shrublands, and open woodlands. Documented foraging in most habitat types in the  
 15 Delta; roosting documented in the Delta in Brannan Island State Recreation Area near the  
 16 central portion of the western conveyance alignment in 2009 (Appendix 12C, *2009 to 2011 Bay  
 17 Delta Conservation Plan EIR/EIS Environmental Data Report*). Occurrence documented during  
 18 the fall in the Montezuma Hills (Sacramento Municipal Utility District 2010). Acoustical records  
 19 during maternity season at several locations within the planning area (Pierson et al. 2006).  
 20 There are six CNDDDB (2013) recorded occurrences in the study area.
- 21 ● **Western small-footed myotis:** Particularly associated with coniferous forests and rocky xeric  
 22 habitats. Typically roosts in rock crevices in mines, caves, and occasionally in buildings, bridges  
 23 and other human structures. Forages over a variety of habitats. This species was detected in the  
 24 Plan Area in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS  
 25 Environmental Data Report*).
- 26 ● **Yuma myotis:** Strongly associated with water sources. Roosts in a variety of structures,  
 27 including bridges, buildings, caves, mines, trees and rock crevices. Has been known to roost in  
 28 cliff swallow nests. Typically forages low over water. This species was detected in the Plan Area  
 29 in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data  
 30 Report*).

### 31 ***Bat Species with Potential to Occur in the Study Area***

- 32 ● **Canyon bat:** Found in arid habitats throughout California and in lower elevation montane  
 33 forests with significant rocky areas. Typically roosts in or under rocks, in crevices in cliffs, rocky  
 34 slopes or scattered boulders. Unsubstantiated records of roosting in burrows. Could occur in the  
 35 Delta but not expected in significant numbers because of limited suitable habitat. Potential calls  
 36 identified during DHCCP 2009 acoustic surveys (Appendix 12C, *2009 to 2011 Bay Delta  
 37 Conservation Plan EIR/EIS Environmental Data Report*).
- 38 ● **Pallid bat:** Occurs in deserts, grasslands, shrublands, woodlands, and forests; most common in  
 39 open, dry habitats; typically roosts in rock crevices, also in tree hollows, bridges, and buildings,  
 40 in colonies ranging from one to more than 200 individuals. May roost and forage throughout the  
 41 Delta, with the highest likelihood in the uplands that surround Clifton Court Forebay. Potential  
 42 call identified during acoustic surveys by DHCCP in 2009 (Appendix 12C, *2009 to 2011 Bay Delta  
 43 Conservation Plan EIR/EIS Environmental Data Report*).

- 1       • **Townsend's big-eared bat:** The Townsend's big-eared bat has never been reported in the  
 2 study area or its vicinity. However, the species is known to occur at three mine sites on the Little  
 3 Blue Ridge in northwestern Yolo County, and at two sites in Alameda County, one near Calaveras  
 4 Reservoir and the other in the hills south of Livermore (California Department of Fish and  
 5 Wildlife 2013). The closest occurrence is approximately 6.4 miles from the study area. The study  
 6 area does not contain caves or mines, which are often used as roosting habitat by Townsend's  
 7 big-eared bats. However, some populations of Townsend's big-eared bat use buildings and other  
 8 man-made structures, such as tunnels and bridges, and individuals have been reported to use  
 9 basal hollows in large trees as roost sites. Possible Townsend's bat guano was identified under  
 10 two of the bridges during the 2009 DHCCP bridge surveys (Appendix 12C, *2009 to 2011 Bay  
 11 Delta Conservation Plan EIR/EIS Environmental Data Report*). The species forages primarily  
 12 along edges of wooded habitats and along streams (Kunz and Martin 1982). Thus, the species  
 13 has the potential to occur in the study area, where it would likely forage and roost along larger  
 14 riparian corridors.
- 15       • **Western mastiff bat:** Typically roosts in crevices in cliffs and rocky outcrops, in colonies of  
 16 fewer than 100 individuals. May also roost in bridges, caves and buildings that allow sufficient  
 17 height and clearance for dropping into flight. There is at least one record of this species roosting  
 18 in an untrimmed palm tree. Forages in a variety of grassland, shrub, and wooded habitats,  
 19 including riparian and urban areas, although most commonly in open, arid lands. May occur  
 20 throughout the Delta but suitable roosting habitat is limited. Not detected during DHCCP  
 21 acoustic surveys in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS  
 22 Environmental Data Report*).

### 23       **San Joaquin Pocket Mouse**

24       The San Joaquin pocket mouse inhabits grassland and scrub habitats with friable soils. The species  
 25 has a NatureServe conservation status of apparently secure, but a status ranging from imperiled to  
 26 vulnerable in California. Its year-round range spans the San Joaquin Valley, Delta, Sacramento Valley  
 27 through Colusa County, and portions of the southern Coast Ranges. The species may occur in  
 28 grasslands in the study area that contain friable soils (Figure 12-52). There are 109 CNDDDB records  
 29 for San Joaquin pocket mouse across its range. There are two CNDDDB records of San Joaquin pocket  
 30 mouse in the southern portion of the Delta in CZ 8 near Clifton Court Forebay (California  
 31 Department of Fish and Wildlife 2013).

### 32       **American Badger**

33       Within the study area, habitat for American badger, a state species of special concern, is restricted to  
 34 grassland along the Plan Area's southwestern edge in CZs 7-10 (Figure 12-53). The study area  
 35 represents the extreme northeastern corner of the species' range in California, which extends  
 36 westward and southward from the study area border. There are five American badger records in the  
 37 study area (California Department of Fish and Wildlife 2013). Two are from 1938 and no longer  
 38 extant. The remaining three are all located in CZ 8, west of Clifton Court Forebay.

### 39       **12.1.3.3       Special-Status Plant Species**

40       Table 12A-1 in Appendix 12A, *Special-Status Species with Potential to Occur in the Study Area*,  
 41 presents detailed information on the special-status plant species known or with potential to occur in  
 42 study area and includes their common and scientific name, listing status (federal, state, and CNPS),  
 43 notes on the species habitat, distribution in California, flowering period, and potential for

1 occurrence in the study area. Nineteen of these species are covered species in the BDCP. The other  
 2 67 species are noncovered species, 36 of which are addressed only in this EIR/EIS. Noncovered  
 3 species in Table 12A-1 that are not known to occur in the study area and that would not be affected  
 4 by the BDCP alternatives were not addressed further.

5 The following summaries provide information on the plant species habitat requirements,  
 6 distribution, and occurrences within the study area. The habitat and distribution information for  
 7 covered species is largely based on the species account information found in BDCP Appendix 2.A  
 8 *Covered Species Accounts*. The habitat and distribution information for noncovered species was  
 9 developed for the EIR/EIS by ICF staff. The habitat models for noncovered species described below  
 10 were based on one or more of the following characteristics: species range; natural communities in  
 11 which they are found; specific vegetation alliances within each natural community; and occurrence  
 12 records. Species occurrence data were obtained from the CNDDDB and from field surveys conducted  
 13 in support of the DHCCP (Appendix 12C, *2009–2011 Bay Delta Conservation Plan EIR/EIS*  
 14 *Environmental Data Report*).

## 15 **Vernal Pool Plants**

### 16 **Alkali Milk-Vetch**

17 Alkali milk-vetch, which has a CRPR of 1B.2, is known from the southern Sacramento Valley,  
 18 northern San Joaquin Valley, and the eastern San Francisco Bay Area (Wojciechowski and  
 19 Spellenberg 2012 p. 750). It grows in alkali grassland and alkali vernal pools and playas (California  
 20 Department of Fish and Wildlife 2013). Alkali seasonal wetland complex, vernal pool complex, and  
 21 managed wetland are the natural community types in the study area that may provide habitat for  
 22 alkali milk-vetch (Figure 12-54). Occurrences have been reported within or abutting CZ 1 (six  
 23 records), CZ 2 (four records), CZ 6 (one record), CZ 8 (two records), and CZ 11 (four records)  
 24 (California Department of Fish and Wildlife 2013). The threats to alkali milk-vetch are development,  
 25 competition from nonnative plants, trampling, energy transmission line construction, and habitat  
 26 destruction, particularly from the conversion of habitat to agriculture (California Native Plant  
 27 Society 2012a).

### 28 **San Joaquin Spearscale**

29 San Joaquin spearscale, which has a CRPR of 1B.2, is known from the western edge of the Central  
 30 Valley and adjacent foothills from Glenn County to Tulare County (Zacharias 2012 p. 634). It grows  
 31 in iodine bush scrub, alkali meadow, and alkali grasslands (California Department of Fish and  
 32 Wildlife 2013). Natural community types in the study area that may provide habitat for San Joaquin  
 33 spearscale are grassland and alkali seasonal wetland complex (Figure 12-54). San Joaquin  
 34 spearscale occurrences have been reported within or abutting CZ 1 (two records), CZ 5 (one record),  
 35 CZ 6 (one record), CZ 8 (seven records), CZ 9 (four records), and CZ 11 (five records) (California  
 36 Department of Fish and Wildlife 2013). The threats to San Joaquin spearscale are grazing,  
 37 agriculture, and development (California Native Plant Society 2012d).

### 38 **Dwarf Downingia**

39 Dwarf downingia, which has a CRPR of 2.2, is known from the inner North Coast Ranges, southern  
 40 Sacramento Valley, and the northern and central portions of the San Joaquin Valley (Schultheis 2012  
 41 p. 591). It occurs in vernal pools (Schultheis 2012 p. 591, California Department of Fish and Wildlife  
 42 2013). The natural community type in the study area that may provide habitat for dwarf downingia

1 is vernal pool complex (Figure 12-54). Dwarf downingia occurrences have been reported within or  
 2 abutting CZ 1 (eight records), CZ 4 (one record), and CZ 11 (three records) (California Department  
 3 of Fish and Wildlife 2013). The threats to dwarf downingia are competition from nonnative plants,  
 4 urbanization, development, agriculture, grazing, vehicles, and industrial forestry (California Native  
 5 Plant Society 2012h).

### 6 **Boggs Lake Hedge-Hyssop**

7 Boggs Lake hedge-hyssop, which is state-listed as endangered and has a CRPR of 1B.2, is a vernal  
 8 pool endemic known from the inner North Coast Ranges, central Sierra Nevada foothills, Sacramento  
 9 Valley, the Modoc Plateau, and one occurrence in Oregon (Estes 2012 p. 1012). The natural  
 10 community type in the study area that provides habitat for Boggs Lake hedge-hyssop is vernal pool  
 11 complex. A single CNDDDB occurrence has been reported within CZ 1 (Figure 12-54) (California  
 12 Department of Fish and Wildlife 2013). Threats to Boggs Lake hedge-hyssop are agriculture,  
 13 development, grazing, trampling, and vehicles (California Native Plant Society 2012j).

### 14 **Legenere**

15 Legenere, which has a CRPR of 1B.1, is known from the southern Sacramento Valley, southern North  
 16 Coast Ranges, northern San Joaquin Valley, Santa Cruz Mountains, and Mount Hamilton ranges  
 17 (Morin 2012 p. 594). It occurs in vernal pools and other seasonal wetlands (California Department  
 18 of Fish and Wildlife 2013). The natural community type in the study area that provides habitat for  
 19 legenere consists of vernal pool complex (Figure 12-54). Legenere occurrences have been reported  
 20 within or abutting CZ 1 (five records), CZ 4 (two records), and CZ 11 (one record) (California  
 21 Department of Fish and Wildlife 2013). Threats to legenere are grazing, road widening, competition  
 22 from nonnative plants, and development (California Native Plant Society 2012m).

### 23 **Heckard's Peppergrass**

24 Heckard's peppergrass, which has a CRPR of 1B.2, is known from the Sacramento Valley and  
 25 northern San Joaquin Valley (California Department of Fish and Wildlife 2013). It occurs in alkali  
 26 grasslands, alkali meadow, and alkali vernal pools (California Department of Fish and Wildlife  
 27 2013). Alkali seasonal wetland complex and vernal pool complex are the natural community types in  
 28 the study area that may provide habitat for Heckard's pepper grass (Figure 12-54). Heckard's  
 29 peppergrass occurrences have been reported in CZ 1 (one record), CZ 2 (two records), and CZ 4 (two  
 30 records) (California Department of Fish and Wildlife 2013). Reported threats to Heckard's pepper  
 31 grass include disking for fire breaks and trampling (California Department of Fish and Wildlife  
 32 2013).

### 33 **Ferris's Milk-Vetch**

34 Ferris's milk-vetch, which has a CRPR of 1B.1, is historically known from the Central Valley from  
 35 Butte County to Alameda County but currently occurs only in Butte, Glenn, Colusa, and Yolo Counties  
 36 (California Department of Fish and Wildlife 2013). It grows in alkali meadows and alkaline flats,  
 37 often on clay soils (Wojciechowski and Spellenberg 2012 p. 750, California Department of Fish and  
 38 Wildlife 2013). Natural community types in the study area that may provide habitat for Ferris's  
 39 milk-vetch are alkali seasonal wetland complex and vernal pool complex (Figure 12-54).

40 Occurrences of Ferris's milk-vetch have been reported within or abutting CZ 1 (one record) and CZ 2  
 41 (two records) (California Department of Fish and Wildlife 2013), and in CZ 8 (three records).

42 Threats to Ferris's milk-vetch are habitat conversion and degradation and grazing.

1       **Vernal Pool Smallscale**

2       Vernal pool smallscale, which has a CRPR of 1B.2, is known from widely scattered occurrences in the  
3       Central Valley from Colusa County to Tulare County (California Department of Fish and Wildlife  
4       2013). It grows in alkali vernal pools (Zacharias 2012 p. 636). The natural community type in the  
5       study area that may provide habitat for vernal pool smallscale is vernal pool complex (Figure 12-  
6       54). Occurrences of vernal pool smallscale have been reported within CZ 1 (one record) and CZ 11  
7       (one record) (California Department of Fish and Wildlife 2013). Possible threats to vernal pool  
8       smallscale are flood-management activities and agriculture (California Native Plant Society 2012t).

9       **Hogwallow Starfish**

10       Hogwallow starfish, which has a CRPR of 4.2, is known primarily from the Great Valley region of the  
11       California Floristic Province and the adjacent foothills but also occurs in the South Coast and  
12       Peninsular ranges (Morefield 2012a: 348). It grows in clay flats, vernal pools, and other habitats  
13       with heavy clay soils (Morefield 2012a). Natural community types in the study area that provide  
14       habitat for hogwallow starfish are grassland and vernal pool complex (Figure 12-54). Hogwallow  
15       starfish was historically collected in Antioch and has been collected at locations adjacent to CZs 1, 2,  
16       and 11 (Consortium of California Herbaria 2012f). Threats to hogwallow starfish are agriculture and  
17       development (California Native Plant Society 2012jj).

18       **Ferris' Goldfields**

19       Ferris's goldfields, which has a CRPR of 4.2, is known from the Sacramento and San Joaquin Valleys  
20       and the valleys of the adjacent foothills (Consortium of California Herbaria 2012g). It occurs in  
21       alkaline vernal pools and wet saline flats (Chan and Ornduff 2012, p. 367). Natural community types  
22       in the study area that provide habitat for Ferris' goldfields consist of alkali seasonal wetland  
23       complex and vernal pool complex. Ferris' goldfields occurrences are present in CZs 8 and 9 (Figure  
24       12-54). Ferris' goldfields occurrences in Contra Costa County are locally significant because they are  
25       at the northwestern edge of the species distribution. Threats to Ferris' goldfields are development  
26       and agriculture (California Native Plant Society 2012nn).

27       **Cotulaleaf Navarretia**

28       Cotulaleaf navarretia, which has a CRPR of 4.2, has a limited distribution in the inner North Coast  
29       Ranges, Sacramento Valley, San Francisco Bay Area, and northern South Coast Ranges (Consortium  
30       of California Herbaria 2012h). It occurs in heavy clay soils of vernal pools, seasonal alkali wetlands,  
31       and grasslands. Natural community types in the study area that provide habitat for cotulaleaf  
32       navarretia consist of alkali seasonal wetland complex, vernal pool complex, and grassland (Figure  
33       12-54). Cotulaleaf navarretia occurrences in Contra Costa County are locally significant because they  
34       are at the southern end of the species distribution. Threats to cotulaleaf navarretia are nonnative  
35       plants and habitat alteration (California Native Plant Society 2012yy).

36       **Contra Costa Goldfields**

37       Contra Costa goldfields is federally listed as endangered and has a CRPR of 1B.1. Contra Costa  
38       goldfields is known from scattered occurrences in the southwestern edge of the Sacramento Valley  
39       and the valleys of the San Francisco Bay Area and the Central Coast (Chan and Ornduff 2012 p. 366).  
40       It grows in vernal pools, swales, and wet meadows (Chan and Ornduff 2012 p. 366, California  
41       Department of Fish and Wildlife 2013). The natural community type in the study area that provides

1 potential habitat for Contra Costa goldfields is vernal pool complex (Figure 12-54). Occurrences of  
 2 Contra Costa goldfields have been reported within and adjacent to CZ 10 (one record) and CZ 11 (six  
 3 records) (California Department of Fish and Wildlife 2013). Threats to Contra Costa goldfields are  
 4 development, alterations to habitat (including hydrology), overgrazing, and competition with  
 5 nonnative plants (California Native Plant Society 2012mm).

### 6 **Baker's Navarretia**

7 Baker's navarretia, which has a CRPR of 1B.1, is known from the inner North Coast Ranges and  
 8 western Sacramento Valley (California Department of Fish and Wildlife 2013). It occurs in vernal  
 9 pools and swales on clay or alkali soils (California Department of Fish and Wildlife 2013). The  
 10 natural community type in the study area that provides habitat for Baker's navarretia is vernal pool  
 11 complex. Baker's navarretia has been reported adjacent to the study area and in CZs 1 and CZ 2  
 12 (Figure 12-54) (California Department of Fish and Wildlife 2013). Threats to Baker's navarretia are  
 13 agriculture, development, habitat alteration, and road construction (California Native Plant Society  
 14 2012oo).

### 15 **Colusa Grass**

16 Colusa grass is federally listed as threatened, state-listed as endangered, and has a CRPR of 1B.1.  
 17 Colusa grass is known from the Central Valley with scattered occurrences from Colusa County to  
 18 Merced County (Reeder 2012). It grows in the bottoms of large, deep vernal pools (California  
 19 Department of Fish and Wildlife 2013). The natural community type in the study area that provides  
 20 habitat for Colusa grass is vernal pool complex. One occurrence of Colusa grass is present in CZ 1  
 21 and other occurrences are adjacent to CZs 1 and 2 (Figure 12-54) (California Department of Fish and  
 22 Wildlife 2013). Threats to Colusa grass are competition with nonnative plants, agriculture,  
 23 development, overgrazing, and flood-management actions (California Native Plant Society 2012pp).

### 24 **Bearded Popcorn-Flower**

25 Bearded popcorn-flower, which has a CRPR of 1B.1, is present in the southern interior North Coast  
 26 Range and the southern Sacramento Valley (Preston et al. 2010). Bearded popcorn-flower was  
 27 presumed extinct until rediscovered in 2005 (Preston et al. 2010). It occurs in vernal pools and  
 28 vernal swales and also in other vernal moist areas in grasslands (Preston et al. 2010). Natural  
 29 community types in the study area that provide habitat for bearded popcorn-flower are vernal pool  
 30 complex and grassland (Figure 12-54). Bearded popcorn-flower occurs within CZs 2 and 11  
 31 (California Department of Fish and Wildlife 2013). Threats to bearded popcorn-flower are disking,  
 32 development, and competition with nonnative plants (California Native Plant Society 2012rr).

### 33 **Saline Clover**

34 Saline clover, which has a CRPR of 1B.2, is known from the Sacramento Valley, the northwestern San  
 35 Joaquin Valley, the San Francisco Bay Area, and the Central Coast (Vincent and Isely 2012 p. 795). It  
 36 occurs in marshes, vernal pools and swales, and iodine bush scrub, generally on saline or alkaline  
 37 soils (California Department of Fish and Wildlife 2013). Alkali seasonal wetland complex, vernal  
 38 pool complex, and tidal brackish emergent wetland are the natural community types in the study  
 39 area that provide potential habitat for saline clover (Figure 12-54). Eight occurrences of saline  
 40 clover have been reported in CZ 1 (one record), CZ 2 (one record), CZ 4 (five records), and CZ 11  
 41 (one record) (California Department of Fish and Wildlife 2013). Threats to saline clover are  
 42 development, trampling, road construction, and vehicles (California Native Plant Society 2012ww).



1       **Solano Grass**

2       Solano grass is federally and state-listed as endangered and has a CRPR of 1B.1. Solano grass is  
 3       known from only three occurrences in the southwestern Sacramento Valley in Solano and Yolo  
 4       Counties, where it grows in vernal pools (California Department of Fish and Wildlife 2013). The  
 5       natural community type in the study area that provides habitat for Solano grass is vernal pool  
 6       complex. All three CNDDDB records for Solano grass are located within or adjacent to conservation  
 7       zones (Figure 12-54). One CNDDDB record of Solano grass occurs within CZ 11, and the other  
 8       occurrences are adjacent to CZ 1 (California Department of Fish and Wildlife 2013). Competition  
 9       from nonnative plants is a threat to Solano grass (California Native Plant Society 2012xx).

10       **Delta Woolly-Marbles**

11       Delta woolly-marbles has a CRPR of 4.2. It is known from scattered locations in the Sacramento  
 12       Valley, San Francisco Bay Area, and northern San Joaquin Valley (Morefield 2012b: 407). It grows in  
 13       vernal pools. The natural community type that provide habitat for Delta woolly-marbles is vernal  
 14       pool complex. Three occurrences are present in the study area, one in CZ 1, one in CZ 4, and one in  
 15       CZ 11 (Figure 12-54) (Consortium of California Herbarium 2012h). Delta woolly-marbles is locally  
 16       uncommon in the study area. Current threats for Delta woolly-marbles are unknown but are likely to  
 17       include habitat alteration (California Native Plant Society 2012bbb).

18       **Alkali Seasonal Wetland Plants**

19       **Brittlescale**

20       Brittlescale, which has a CRPR of 1B.2, is known from the eastern and western portions of the  
 21       Central Valley and the adjacent foothills on the Central Valley's west side (Zacharias 2012 p. 633–  
 22       634, California Department of Fish and Wildlife 2013). It grows in iodine bush scrub and alkali  
 23       grasslands on the margins of vernal pools, swales, slickspots and scalds (California Department of  
 24       Fish and Wildlife 2013). Alkali seasonal wetland complex, and vernal pool complex are the natural  
 25       community types in the study area that may provide habitat for brittlescale (Figure 12-55).  
 26       Brittlescale occurrences have been reported within or abutting CZ 1 (two records), CZ 8 (two  
 27       records), and CZ 11 (three records) (California Department of Fish and Wildlife 2013). The threats  
 28       to brittlescale are development, grazing, and trampling (California Native Plant Society 2012c).

29       **Heartscale**

30       Heartscale, which has a CRPR of 1B.2, is known from the western side of the Central Valley and the  
 31       valleys of adjacent foothills (Zacharias 2012 p. 633, California Department of Fish and Wildlife  
 32       2013). It grows in iodine bush scrub, alkali meadow, and alkali grasslands on the margins of vernal  
 33       pools, swales, slickspots and scalds (California Department of Fish and Wildlife 2013). The natural  
 34       community types in the study area that may provide heartscale habitat is alkali seasonal wetland  
 35       complex (Figure 12-55). Heartscale occurrences have been reported within or abutting CZ 1 (three  
 36       records), CZ 6 (one record), CZ 8 (one record), and CZ 11 (one record) (California Department of  
 37       Fish and Wildlife 2013). The threats to heartscale are competition from nonnative plants and  
 38       trampling (California Native Plant Society 2012b).

39       **Delta Button Celery**

40       Delta button celery, which is state-listed as endangered and has a CRPR of 1B.1, occurs in the  
 41       northern San Joaquin Valley (Preston et al. 2012 p. 182). It is associated with vernal mesic

1 depressions that occur within the historic floodplain of the San Joaquin River, which can be  
 2 characterized as vernal pool complex or, when stands of trees and shrubs occur in a mosaic with  
 3 open areas of pools and swales, as valley/foothill riparian (Figure 12-55) (California Department of  
 4 Fish and Wildlife 2013). Three Delta button celery occurrences have been reported within or  
 5 abutting CZ 7 (two records) and CZ 9 (one record) (California Department of Fish and Wildlife  
 6 2013). The threats to Delta button celery are flood-management activities, competition from  
 7 nonnative plants, and agriculture (California Native Plant Society 2012i).

### 8 **Crownscale**

9 Crownscale, which has a CRPR of 4.2, is known from the southern Sacramento Valley, eastern San  
 10 Joaquin Valley, eastern San Francisco Bay Area, and the inner South Coast Ranges (Zacharias 2012 p.  
 11 633). It occurs in chenopod scrub, alkaline grassland, and alkaline vernal pools (California Native  
 12 Plant Society 2012zz). Alkali seasonal wetland complex and vernal pool complex are the natural  
 13 community types that may provide habitat for crownscale in the study area. Occurrences of  
 14 crownscale have been reported in CZs 7, 8 9, and 11 (Figure 12-55) (Consortia of California Herbaria  
 15 2012a). In addition, reported occurrences of heartscale and Lost Hills crownscale from the vicinity  
 16 of Byron are presumed to be crownscale (R. Preston pers. comm.). Crownscale occurrences in the  
 17 study area are locally significant because they are at the northern edge of the species distribution.

### 18 **Palmate-Bracted Bird's-Beak**

19 Palmate-bracted bird's-beak, is federally and state-listed as endangered and has a CRPR of 1B.1.  
 20 Palmate-bracted bird's-beak is known from the Livermore Valley and scattered locations in the  
 21 Central Valley from Colusa County to Fresno County (Wetherwax and Tank 2012 p. 966; California  
 22 Department of Fish and Wildlife 2013). It occurs in iodine bush scrub, alkali meadow, and alkali  
 23 grassland, often on the margins of swales, scalds, or vernal pools (California Department of Fish and  
 24 Wildlife 2013). Natural community types in the study area that may provide habitat for palmate-  
 25 bracted bird's-beak are alkali seasonal wetland complex and vernal pool complex (Figure 12-55). A  
 26 single occurrence of palmate-bracted bird's-beak was reported in CZ 6 near Stockton, but it was last  
 27 observed in 1881 and is possibly extirpated (California Department of Fish and Wildlife 2013).  
 28 Threats to palmate-bracted bird's-beak are agriculture, urbanization, vehicles, altered hydrology,  
 29 grazing, and development (California Native Plant Society 2012z).

### 30 **Recurved Larkspur**

31 Recurved larkspur, which has a CRPR of 1B.2, was formerly widespread in the Central Valley from  
 32 Colusa County to Kern County, although it has been extirpated from the Sacramento Valley (Koontz  
 33 and Warnock 2012 p. 1411; California Department of Fish and Wildlife 2013). It occurs in chenopod  
 34 scrub and grassland on poorly drained, fine, alkaline soils (Koontz and Warnock 2012 p. 1411).  
 35 Natural community types in the study area that may provide habitat for recurved larkspur are  
 36 grassland and seasonal alkali wetland complex. Four occurrences of recurved larkspur have been  
 37 reported in CZ 8 (Figure 12-55) (California Department of Fish and Wildlife 2013). Threats to  
 38 recurved larkspur are grazing and trampling (California Native Plant Society 2012cc).

## 1 **Grassland Plants**

### 2 **Caper-Fruited Tropicocarpum**

3 Caper-fruited tropidocarpum, which has a CRPR of 1B.1, is historically known from the northwest  
4 San Joaquin Valley and adjacent Diablo Range foothills and has recently been reported from Fresno,  
5 Monterey, and San Luis Obispo Counties (California Department of Fish and Wildlife 2013). It grows  
6 in alkali grasslands. Grassland and alkali seasonal wetland complex are the natural community types  
7 in the study area that may provide habitat for caper-fruited tropidocarpum (Figure 12-56).  
8 Occurrences of caper-fruited tropidocarpum have been reported within or abutting CZ 7 (four  
9 records), CZ 8 (two records), and CZ 9 (one record) (California Department of Fish and Wildlife  
10 2013). Possible threats to caper-fruited tropidocarpum are grazing, military activities, competition  
11 with nonnative plants, and trampling (California Native Plant Society 2012r).

### 12 **Carquinez Goldenbush**

13 Carquinez goldenbush, which has a CRPR of 1B.1, is known from the southern Sacramento Valley  
14 between Jepson Prairie and Suisun Marsh (Keil 2012b p. 360, California Department of Fish and  
15 Wildlife 2013). It occurs in grasslands with alkali soils. The natural community type in the study  
16 area that provides habitat for Carquinez goldenbush is grassland (Figure 12-56). Carquinez  
17 goldenbush occurrences have been reported within or abutting CZ 1 (three records) and CZ 11  
18 (seven records) (California Department of Fish and Wildlife 2013). Probable threats to Carquinez  
19 goldenbush are development and agriculture (California Native Plant Society 2012k).

### 20 **Big Tarplant**

21 Big tarplant, which has a CRPR of 1B.1, is known from the eastern San Francisco Bay Area and  
22 northwestern San Joaquin Valley (Baldwin 2012a). It occurs in annual grasslands on clay to clay-  
23 loam soils, usually on slopes (California Department of Fish and Wildlife 2013). The natural  
24 community type in the study area that may provide habitat for big tarplant is grassland (Figure 12-  
25 56). Occurrences of big tarplant have been reported in CZ 7 (one record) and CZ 10 (three records)  
26 and adjacent to CZ 6 (one record) (California Department of Fish and Wildlife 2013). Residential  
27 development poses a threat to big tarplant. The extirpation of historical occurrences is likely the  
28 result of agriculture and competition from nonnative plants (California Native Plant Society 2012u).

### 29 **Round-Leaved Filaree**

30 Round-leaved filaree, which has a CRPR of 1B.1, is known from scattered occurrences in the Central  
31 Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands,  
32 Transverse ranges, and Peninsular ranges (Alarcón et al. 2012). It occurs in grasslands and open,  
33 grassy areas in oak woodland (California Department of Fish and Wildlife 2013). The natural  
34 community type in the study area that may provide habitat for round-leaved filaree is grassland  
35 (Figure 12-56). Four occurrences of round-leaved filaree have been reported within or adjacent to  
36 CZ 6 (one record), CZ 7 (two records), and CZ 10 (one record) (California Department of Fish and  
37 Wildlife 2013). Threats to round-leaved filaree are habitat alteration, feral pigs, vehicles,  
38 competition from nonnative plants, urbanization, pipeline construction, and possibly grazing  
39 (California Native Plant Society 2012v).

### 1 **Pappose Tarplant**

2 Pappose tarplant, which has a CRPR of 1B.2, is known from the northern Central Coast, the North  
3 Coast Ranges, and the southern Sacramento Valley (Baldwin 2012b p. 274). It occurs in grassland, at  
4 the margins of coastal salt marsh, and in alkaline seeps and springs (Baldwin 2012b). Natural  
5 community types in the study area that may provide habitat for pappose tarplant are alkali seasonal  
6 wetland complex and grassland. Eight occurrences of pappose tarplant have been reported within or  
7 adjacent to CZ 11 (Figure 12-56) (California Department of Fish and Wildlife 2013). Threats to  
8 pappose tarplant are habitat disturbance, agriculture, competition from nonnative species,  
9 development, grazing, and road maintenance (California Native Plant Society 2012x).

### 10 **Parry's Rough Tarplant**

11 Parry's rough tarplant has a CRPR of 4.2. It occurs in scattered grassland remnants in the  
12 Sacramento and northern San Joaquin Valleys (Baldwin 2012b p. 274). It occurs in grasslands,  
13 sometimes at the margins of marshes or vernal pools, or in ruderal habitat (Baldwin 2012b p. 274).  
14 Grassland, alkali seasonal wetland complex, and vernal pool complex are natural community types  
15 in the study area that may provide habitat for Parry's rough tarplant (Figure 12-56). Five  
16 occurrences of Parry's rough tarplant have been reported from CZs 2, 3, 4, and 6 (Lazar pers. comm.;  
17 Consortia of California Herbaria 2012b). Although common and abundant in a few locations, many  
18 of the occurrences are small and localized, often small, disturbed patches in road or railroad rights-  
19 of-way. Parry's rough tarplant occurrences in the study area are locally significant because the  
20 species' habitat in the study area has been greatly diminished and fragmented by conversion to  
21 agricultural land (California Native Plant Society 2012y).

### 22 **Small-Flowered Morning-Glory**

23 Small-flowered morning-glory has a CRPR of 4.2. It occurs at scattered locations in coastal California  
24 and the Coast Ranges from Contra Costa County to San Diego County and in the southern Sierra  
25 Nevada foothills (Consortium of California Herbaria 2012c). Habitat for small-flowered morning-  
26 glory consists of grasslands or open grassy areas in chaparral or coastal sage scrub, usually on clay  
27 soils, but sometimes on serpentine soils (Preston and Dempster 2012: 659). Potential habitat for  
28 small-flowered morning-glory would be grasslands along the western edges of CZs 7, 8, and 9.  
29 Although no occurrences are known from the study area, three occurrences are reported from areas  
30 adjacent to the study area, and suitable habitat is present in the study area (Figure 12-56). Small-  
31 flowered morning-glory occurrences in Contra Costa County are locally significant because they are  
32 at the northern edge of the species distribution and disjunct from the nearest occurrences in  
33 Stanislaus County. It is threatened by development and possibly threatened by nonnative plants  
34 (California Native Plant Society 2012bb).

### 35 **Diamond-Petaled California Poppy**

36 Diamond-petaled California poppy, which has a CRPR of 1B.1, was known historically from the  
37 interior foothills of the North and South Coast Ranges but is currently known from only three  
38 locations in Alameda County and San Luis Obispo County (Hannan and Clark 2012 p. 984, California  
39 Department of Fish and Wildlife 2013). The natural community type in the study area that may  
40 provide habitat for diamond-petaled California poppy is grassland. Two historic occurrences of  
41 diamond-petaled California poppy are in the study area (Figure 12-56). One occurrence overlaps  
42 with CZ 7 and CZ 8, and the second occurrence is located within CZ 10 (California Department of

1 Fish and Wildlife 2013). Threats to diamond-petaled California poppy are agriculture and grazing  
2 (California Native Plant Society 2012gg).

### 3 **Stinkbells**

4 Stinkbells, which has a CRPR of 4.2, is known from the foothills of the North and South Coast Ranges,  
5 the Sierra Nevada foothills, and the Central Valley (McNeal and Nees 2012 p. 1388, Consortium of  
6 California Herbaria 2012e). It occurs in grasslands and in grassy, open areas in chaparral, oak  
7 woodland, and pinyon-juniper woodland, usually on clay or serpentine soils (California Native Plant  
8 Society 2012hh). The natural community type in the study area that may provide habitat for  
9 stinkbells is grassland. A single occurrence of stinkbells has been reported along the southern  
10 boundary of CZ 10 and is presumed extant (Figure 12-56) (California Department of Fish and  
11 Wildlife 2013). Threats to stinkbells are development and grazing (California Native Plant Society  
12 2012hh).

### 13 **Fragrant Fritillary**

14 Fragrant fritillary, which has a CRPR of 1B.2, is known from the southern Sacramento Valley,  
15 southern North Coast Ranges, San Francisco Bay Area, and northern Central Coast (California  
16 Department of Fish and Wildlife 2013). It occurs in grasslands, coastal prairie, and open, grassy  
17 areas in coastal scrub and oak woodlands, often on serpentine soils (California Department of Fish  
18 and Wildlife 2013; California Native Plant Society 2012ii). The natural community type in the study  
19 area that provides habitat for fragrant fritillary is grassland (Figure 12-56). Occurrences of fragrant  
20 fritillary have been reported within CZ 1 (four records) and CZ 11 (one record) (California  
21 Department of Fish and Wildlife 2013). Threats to fragrant fritillary are grazing, agriculture,  
22 urbanization, competition from nonnative plants, and possibly recreational activities (California  
23 Native Plant Society 2012ii).

### 24 **Streamside Daisy**

25 Streamside daisy has a CRPR of 3, indicating that more information is needed on the distribution  
26 and level of threat. However, only 31 occurrences have been recorded (Consortium of California  
27 Herbaria 2012d), indicating that the species is rare. The species occurs along the western edge of  
28 the Klamath ranges and outer North Coast Ranges from Humboldt County south to Solano County.  
29 Dry slopes and rock outcrops, often along rivers, provide habitat for streamside daisy (Keil and  
30 Nesom 2012 p. 317). One occurrence is present in CZ 11, west of Interstate 680, and a second  
31 occurrence near Cordelia is adjacent to the study area (Figure 12-56).

### 32 **Gairdner's Yampah**

33 Gairdner's yampah has a CRPR of 4.2. It occurs primarily along the California coast and inland into  
34 the North Coast Ranges (Constance and Wetherwax 2012 p. 196). It grows in seasonally wet areas in  
35 coastal prairie and grasslands and in open, grassy areas in chaparral and broadleaved upland forest  
36 (California Native Plant Society 2012ccc). Although no occurrences are known from the study area,  
37 Gairdner's yampah occurs in areas adjacent to CZ 11, and suitable habitat occurs in CZ 11  
38 (Consortium of California Herbaria 2012i). Natural community types in the study area that provide  
39 habitat for Gairdner's yampah are grasslands and vernal pool complex (Figure 12-56). Gairdner's  
40 yampah occurs in widely scattered locations and is locally uncommon in the study area. Gairdner's  
41 yampah is threatened by agriculture, grazing, nonnative plants, habitat alteration, and urbanization  
42 (California Native Plant Society 2012ccc).

## 1 **Keck's Checkerbloom**

2 Keck's checkerbloom is federally listed as endangered. It has no state listing status but has a  
 3 California Rare Plant Rank of 1B.1 (California Department of Fish and Wildlife 2013). Prior to 2009,  
 4 Keck's checkerbloom was known from only three occurrences in Tulare County. During a review of  
 5 specimens in preparation for the revised treatment of *Sidalcea* for the Jepson Manual second edition,  
 6 Hill (2009) determined that specimens collected from occurrences in Napa, Yolo, and Solano  
 7 Counties should also be regarded as Keck's checkerbloom. Therefore, the current range for the  
 8 species is the southern Inner North Coast Ranges, the southern Sacramento Valley, and the southern  
 9 Sierra Nevada foothills (Hill 2012a p.893). Habitat for the species usually is grassy areas within blue  
 10 oak woodland, often on clay soils, at elevations between 280 and 1,950 feet (California Department  
 11 of Fish and Wildlife 2013; Hill 2012a). Grassland is the natural community type in the study area  
 12 that may provide habitat for Keck's checkerbloom. No occurrences have been reported from the  
 13 Plan Area, but two occurrences are adjacent to the east side of CZ 11, one of which is within the  
 14 study area for the western power alternative (Figure 12-56). Potential threats to Keck's  
 15 checkerbloom include grazing and competitive from nonnative grasses, and one occurrence has  
 16 been extirpated by conversion to an orchard (California Department of Fish and Wildlife 2013).

## 17 **Valley/Foothill Riparian Plants**

### 18 **Delta Button Celery**

19 Delta button celery, which is state-listed as endangered and has a CRPR of 1B.1, occurs in the  
 20 northern San Joaquin Valley (Preston et al. 2012 p. 182). It is associated with vernal mesic  
 21 depressions that occur within the historic floodplain of the San Joaquin River, which can be  
 22 characterized as vernal pool complex or, when stands of trees and shrubs occur in a mosaic with  
 23 open areas of pools and swales, as valley/foothill riparian (Figure 12-57) (California Department of  
 24 Fish and Wildlife 2013). Three Delta button celery occurrences have been reported within or  
 25 abutting CZ 7 (two records) and CZ 9 (one record) (California Department of Fish and Wildlife  
 26 2013). The threats to Delta button celery are flood-management activities, competition from  
 27 nonnative plants, and agriculture (California Native Plant Society 2012i).

### 28 **Slough Thistle**

29 Slough thistle, which has a CRPR of 1B.1, is known from the San Joaquin Valley in Kern, Kings, and  
 30 San Joaquin Counties (Keil 2012a p. 285; California Department of Fish and Wildlife 2013). It occurs  
 31 in freshwater marsh along sloughs and river banks, often in clay or alkali soils (California  
 32 Department of Fish and Wildlife 2013). Natural community types in the study area that may provide  
 33 habitat for slough thistle are nontidal freshwater perennial emergent wetland and valley/foothill  
 34 riparian (Figure 12-57). Two CNDDB occurrences of slough thistle have been reported in CZ 7  
 35 (California Department of Fish and Wildlife 2013). The threats to slough thistle are agriculture and  
 36 competition from nonnative plants (California Native Plant Society 2012f).

### 37 **Northern California Black Walnut**

38 Native stands of northern California black walnut have been assigned a CRPR of 1B.1; however,  
 39 individual trees of this species are generally considered to be naturalized, rather than native  
 40 (California Native Plant Society 2012ll). Native stands of northern California black walnut were  
 41 historically present in the California in the southern portion of the Inner North Coast Ranges, the  
 42 southern Sacramento Valley, the northern San Joaquin Valley, and the San Francisco Bay Area

1 (Whittemore 2012 p. 833). The last two native stands of northern California black walnut are  
 2 located in Napa and Contra Costa Counties but fall outside the study area (California Department of  
 3 Fish and Wildlife 2013). An historic occurrence, which was reported on both sides of the  
 4 Sacramento River between Freeport and Rio Vista, is believed to be extirpated (California  
 5 Department of Fish and Wildlife 2013). The natural community type in the study area that provides  
 6 potential habitat for northern California black walnut is valley/foothill riparian (Figure 12-57).  
 7 Threats to northern California black walnut are urbanization, conversion to agriculture, and  
 8 hybridization with orchard trees (California Native Plant Society 2012ll).

### 9 **Wright's Trichocoronis**

10 Wright's trichocoronis, which has a CRPR of 2.1, is known from scattered locations in the Central  
 11 Valley and South Coast (Keil and Powell 2012). It has been found in various wetland types, including  
 12 alkaline meadow and floodplain wetlands, sometimes in drying mud (California Department of Fish  
 13 and Wildlife 2013). Natural community types in the study area that provide potential habitat for  
 14 Wright's trichocoronis consist of nontidal freshwater perennial emergent wetland and  
 15 valley/foothill riparian. An historic occurrence of Wright's trichocoronis in CZ 7 was last seen in  
 16 1914 (Figure 12-57) (California Department of Fish and Wildlife 2013). Wright's trichocoronis is  
 17 threatened by habitat loss to agriculture and urbanization (California Native Plant Society 2012uu).

## 18 **Tidal Wetland Plants**

### 19 **Delta Mudwort**

20 Delta mudwort, which has a CRPR of 2.1, is mostly known from the Sacramento-San Joaquin Delta  
 21 and from a single occurrence in Marin County (Wetherwax 2012). It is native to the East Coast of  
 22 North America and may have been introduced to California (Wetherwax 2012). It grows on the bare  
 23 soil of mudflats and river banks and on pilings, riprap, and other exposed substrates (California  
 24 Department of Fish and Wildlife 2013). Tidal brackish emergent wetland, tidal freshwater emergent  
 25 wetland, and valley/foothill riparian are the natural community types in the study area that may  
 26 provide habitat for Delta mudwort (Figure 12-58). Delta mudwort occurrences have been reported  
 27 within or abutting CZ 1 (one record), CZ 3 (one record), CZ 5 (24 records), CZ 6 (22 records), CZ 8  
 28 (four records), CZ 10 (three records), and CZ 11 (three records) (California Department of Fish and  
 29 Wildlife 2013). Threats to Delta mudwort in California are erosion, recreation, trampling, flotsam  
 30 deposition, riprap, possible tidal gate installation, grazing on adjacent land, fishing access,  
 31 streambank alteration for wetlands restoration, trash, levee maintenance/upgrades, rising sea  
 32 levels, and increased salinity (California Native Plant Society 2012o).

### 33 **Delta Tule Pea**

34 Delta tule pea, which has a CRPR of 1B.2, occurs in tidal habitats along the margins of San Pablo Bay,  
 35 Suisun Bay, Suisun Marsh, and the rivers and sloughs of the Delta (California Department of Fish and  
 36 Wildlife 2013). It grows in brackish and freshwater marsh, generally on the margins of sloughs and  
 37 marshes (California Department of Fish and Wildlife 2013). Tidal brackish emergent wetland, tidal  
 38 freshwater emergent wetland, and valley/foothill riparian habitat are the natural community types  
 39 in the study area that may provide habitat for Delta tule pea (Figure 12-58). Delta tule pea  
 40 occurrences have been reported within or abutting CZ 1 (five records), CZ 3 (three records), CZ 4  
 41 (two records), CZ 5 (30 records), CZ 6 (16 records), CZ 9 (two records), and CZ 11 (47 records)

1 (California Department of Fish and Wildlife 2013). Threats to Delta tule pea are water diversions,  
2 agriculture, and erosion (California Native Plant Society 2012l).

### 3 **Mason's Lilaepsis**

4 Mason's lilaepsis is state-listed as rare under the California Native Plant Protection Act (CNPPA)  
5 and has a CRPR of 1B.1. Mason's lilaepsis occurs in Suisun Bay, Suisun Marsh, and the Delta  
6 (California Department of Fish and Wildlife 2013). It grows on the bare soil of mudflats and river  
7 banks and on pilings, riprap, and other exposed substrates (California Department of Fish and  
8 Wildlife 2013). Natural community types in the study area that may provide habitat for Mason's  
9 lilaepsis are tidal brackish emergent wetland, tidal freshwater emergent wetland, and  
10 valley/foothill riparian (Figure 12-58). Mason's lilaepsis occurrences have been reported within or  
11 abutting CZ 1 (seven records), CZ 2 (two records), CZ 3 (three records), CZ 4 (one record), CZ 5 (51  
12 records), CZ 6 (59 records), CZ 7 (two records), CZ 8 (14 records), CZ 9 (six records), CZ 10 (eight  
13 records), and CZ 11 (26 records) (California Department of Fish and Wildlife 2013). Threats to  
14 Mason's lilaepsis are erosion, channel stabilization, development, flood-management projects,  
15 recreation, agriculture, shading resulting from marsh succession, and competition with invasive  
16 water hyacinth (*Eichhornia crassipes*) (California Native Plant Society 2012n).

### 17 **Side-Flowering Skullcap**

18 Side-flowering skullcap, which has a CRPR of 2.2, is known in California from the Delta (California  
19 Department of Fish and Wildlife 2013). It is more widespread outside of California, where it ranges  
20 north to British Columbia and to the East Coast (Olmstead 2012 p. 856). It occurs in wet meadows  
21 and marshes, often on logs (Olmstead 2012 p. 856, California Department of Fish and Wildlife 2013).  
22 Natural community types in the study area that may provide habitat for side-flowering skullcap  
23 consist of tidal freshwater emergent wetland and valley/foothill riparian (Figure 12-58). Side-  
24 flowering skullcap occurrences have been reported in CZ 4 (three records) and CZ 5 (nine records)  
25 (California Department of Fish and Wildlife 2013). Water recreation and hydrological alterations  
26 may be threats to side-flowering skullcap (California Department of Fish and Wildlife 2013,  
27 California Native Plant Society 2012p).

### 28 **Soft Bird's-Beak**

29 Soft bird's-beak, known from the northern Central Coast and the Delta (Wetherwax and Tank 2012  
30 p. 966), is federally listed as endangered, state listed as rare under the CNPPA, and has a CRPR of  
31 1B.2. It grows in coastal salt marsh (Wetherwax and Tank 2012 p. 966, California Department of  
32 Fish and Wildlife 2013). Natural community types in the study area that may provide habitat for soft  
33 bird's-beak are tidal brackish emergent wetland and managed wetland (Figure 12-58). Soft bird's-  
34 beak occurrences have been reported within or abutting CZ 10 (one record) and CZ 11 (13 records)  
35 (California Department of Fish and Wildlife 2013). The threats to soft bird's-beak are feral pigs,  
36 erosion, competition from nonnative plants, marsh drainage, and trampling (California Native Plant  
37 Society 2012e).

### 38 **Suisun Marsh Aster**

39 Suisun Marsh aster has a CRPR of 1B.2. Suisun Marsh aster occurrences have been reported in the  
40 Delta, particularly in Suisun Marsh and Suisun Bay, and in Contra Costa, Napa, Sacramento, San  
41 Joaquin, and Solano Counties (California Department of Fish and Wildlife 2013). It grows in  
42 freshwater marsh, especially along sloughs (California Department of Fish and Wildlife 2013).



1 Natural community types in the study area that may provide habitat for Suisun Marsh aster are tidal  
 2 brackish emergent wetland, tidal freshwater emergent wetland, and valley/foothill riparian (Figure  
 3 12-58). Occurrences of Suisun Marsh aster have been reported within or abutting CZ 1 (seven  
 4 records), CZ 2 (seven records), CZ 3 (six records), CZ 4 (two records), CZ 5 (56 records), CZ 6 (36  
 5 records), CZ 7 (two records), CZ 10 (seven records), and CZ 11 (41 records) (California Department  
 6 of Fish and Wildlife 2013). Threats to Suisun Marsh aster are erosion, marsh habitat alteration and  
 7 loss, and possibly herbicide application (California Native Plant Society 2012q).

#### 8 **Suisun Thistle**

9 Suisun thistle is federally listed as endangered and has a CRPR of 1B.1. It is known only from Suisun  
 10 Marsh, where it grows in tidal marsh (Keil 2012a p. 286). Natural community types in the study area  
 11 that may provide habitat for Suisun thistle are tidal brackish emergent wetland and managed  
 12 wetland. Four CNDDDB occurrences of Suisun thistle have been reported in CZ 11 (Figure 12-58)  
 13 (California Department of Fish and Wildlife 2013). The threats to Suisun thistle are foot traffic and  
 14 cattle tramping (California Native Plant Society 2012g).

#### 15 **Bolander's Water-Hemlock**

16 Bolander's water-hemlock, which has a CRPR of 2.1, is known from occurrences along California's  
 17 South Coast and Central Coast regions and from Suisun Marsh (Wetherwax and Constance 2012). It  
 18 grows in coastal brackish and freshwater marshes (Wetherwax and Constance 2012; California  
 19 Department of Fish and Wildlife 2013). Tidal brackish emergent wetland and tidal freshwater  
 20 emergent wetland are natural community types in the study area that may provide habitat for  
 21 Bolander's water-hemlock (Figure 12-58). Eight occurrences of Bolander's water-hemlock have  
 22 been reported in CZ 1 (one record), CZ 5 (two records), CZ 10 (one record), and CZ 11 (four records)  
 23 (California Department of Fish and Wildlife 2013). Threats to Bolander's water-hemlock are  
 24 development, competition from nonnative plants, and hydrological alterations (California Native  
 25 Plant Society 2012aa).

#### 26 **Inland Dune Plants**

##### 27 **Hoover's Cryptantha**

28 Hoover's cryptantha, which has a CRPR of 1A, was last seen in 1939 (California Native Plant Society  
 29 2012aaa). The historic range of Hoover's cryptantha was the northern and central San Joaquin  
 30 Valley (Kelley et al. 2012 p. 463). It was collected while growing in coarse, sandy soils (Johnston  
 31 1937). Natural community types in the study area that may provide habitat for Hoover's cryptantha  
 32 are inland dune scrub and grassland (Figure 12-59). Hoover's cryptantha was collected in 1908 in  
 33 CZ 10 from sand hills east of Antioch, but the exact location is unknown and the species may have  
 34 been extirpated because of development (California Department of Fish and Wildlife 2013).

##### 35 **Antioch Dunes Buckwheat**

36 Antioch Dunes buckwheat, which has a CRPR of 1B.1, is known from a single occurrence in the  
 37 Antioch Dunes in Contra Costa County (Reveal 2007). Habitat for Antioch Dunes buckwheat in the  
 38 study area is limited to inland dune scrub (Figure 12-59). The occurrence of Antioch Dunes  
 39 buckwheat is located in CZ 10 (California Department of Fish and Wildlife 2013). A potential threat  
 40 to Antioch Dunes buckwheat is competition from nonnative plants (California Native Plant Society  
 41 2012dd).

1 **Mt. Diablo Buckwheat**

2 Mt. Diablo buckwheat, which has a CRPR of 1B.1, was historically known from Alameda, Contra  
3 Costa, and Solano Counties and was recently rediscovered on Mt. Diablo (California Department of  
4 Fish and Wildlife 2013; California Native Plant Society 2012ee). Potential habitat for Mt. Diablo  
5 buckwheat in the study area consists of grassland and inland dune scrub. Two occurrences of Mt.  
6 Diablo buckwheat have been reported within CZ 10 and CZ 11 (Figure 12-59) (California  
7 Department of Fish and Wildlife 2013). The primary threat to Mt. Diablo buckwheat has been  
8 habitat loss, and the remaining population is potentially threatened by trampling and competition  
9 from nonnative plant (California Native Plant Society 2012ee).

10 **Contra Costa Wallflower**

11 Contra Costa wallflower, is federally and state-listed as endangered and has a CRPR of 1B.1. Contra  
12 Costa wallflower is known only from three occurrences on the Antioch Dunes in Contra Costa  
13 County (California Department of Fish and Wildlife 2013), which fall within CZ 10 (Figure 12-59).  
14 Habitat for Contra Costa wallflower in the study area is restricted to inland dune scrub. Threats to  
15 Contra Costa wallflower are agricultural conversion, industrial development, mining, and  
16 competition from nonnative plants (California Native Plant Society 2012ff).

17 **Antioch Dunes Evening-Primrose**

18 Antioch Dunes evening-primrose is federally and state-listed as endangered and has a CRPR of 1B.1.  
19 Antioch Dunes evening-primrose is endemic to the Antioch Dunes in Contra Costa County, although  
20 it has been introduced at several transplantation sites (California Department of Fish and Wildlife  
21 2013). Potential habitat for Antioch Dunes evening-primrose in the study area is restricted to inland  
22 dune scrub. The native occurrences of Antioch Dunes evening-primrose in the study area are located  
23 in CZ 10 (Figure 12-59). Three transplant sites are located in CZ 5 (California Department of Fish  
24 and Wildlife 2013). Threats to Antioch Dunes evening-primrose are agriculture, mining, competition  
25 from nonnative plants, and industrial development (California Native Plant Society 2012qq).

26 **Nontidal Wetland Plants**

27 **Watershield**

28 Watershield, which has a CRPR of 2.3, is known from scattered occurrences in northern and central  
29 California, although it has a world-wide distribution (Rosatti 2012). It is an aquatic species that  
30 occurs in ponds and slow streams (Rosatti 2012). Nontidal perennial aquatic and nontidal  
31 freshwater perennial emergent wetland are the natural community types in the study area that may  
32 provide habitat for watershield (Figure 12-60). Watershield occurrences have been reported within  
33 CZ 4 (one record) and CZ 5 (one record) and adjacent to the eastern boundary of CZ 6 (one record)  
34 (California Department of Fish and Wildlife 2013).

35 **Bristly Sedge**

36 Bristly sedge, which has a CRPR of 2.1, is known from scattered occurrences in California, primarily  
37 in Northern California; it also occurs in Oregon, Washington, and elsewhere in North America (Zika  
38 et al 2012 p. 1322; California Department of Fish and Wildlife 2013). It occurs in marshes at the  
39 margins of sloughs and lakes (California Department of Fish and Wildlife 2013). The natural  
40 community type in the study area that may provide habitat for bristly sedge is nontidal freshwater  
41 perennial emergent wetland (Figure 12-60). Occurrences of bristly sedge have been reported within

1 CZ 4 (nine records), CZ 5 (seven records), and CZ 6 (two records) (California Department of Fish and  
 2 Wildlife 2013). Threats to bristly sedge are road maintenance, marsh drainage, agriculture, grazing,  
 3 flooding for The Delta Wetlands Project, competition from nonnative plants, and control treatments  
 4 for water hyacinth (California Department of Fish and Wildlife 2013; California Native Plant Society  
 5 2012w).

### 6 **Woolly Rose-Mallow**

7 Woolly rose-mallow, which has a CRPR of 1B.2, is known from scattered occurrences in the Cascade  
 8 Range foothills, Sacramento Valley and the Delta (Hill 2012b). It grows in freshwater marsh along  
 9 river banks and sloughs (Hill 2012b; California Department of Fish and Wildlife 2013). Nontidal  
 10 freshwater perennial emergent wetland, tidal freshwater emergent wetland, and valley/foothill  
 11 riparian are the natural community types in the study area that provide habitat for woolly rose-  
 12 mallow (Figure 12-60). Woolly rose-mallow occurrences have been reported within and adjacent to  
 13 CZ 1 (two records), CZ 3 (nine records), CZ 4 (10 records), CZ 5 (27 records), CZ 6 (49 records), CZ 7  
 14 (two records), CZ 8 (14 records), and CZ 9 (seven records) (California Department of Fish and  
 15 Wildlife 2013). Threats to woolly rose-mallow are habitat disturbance, development, agriculture,  
 16 recreational activities, weed control measures, erosion, and channelization of the Sacramento River  
 17 and its tributaries (California Native Plant Society 2012kk).

### 18 **Eel-Grass Pondweed**

19 Eel-grass pondweed, which has a CRPR of 2.2, is known in California from scattered occurrences in  
 20 the southern interior North Coast Ranges, the Central Valley, and the Modoc Plateau (Hellquist et al.  
 21 2012 p. 1501). It is a perennial aquatic species that grows in ponds, lakes and streams (Hellquist et  
 22 al. 2012 p. 1501). Natural community types in the study area that provide potential habitat for eel-  
 23 grass pondweed consist of nontidal perennial aquatic and nontidal freshwater perennial emergent  
 24 wetland. One occurrence of eel-grass pondweed has been reported in CZ 6 (Figure 12-60) (California  
 25 Department of Fish and Wildlife 2013).

### 26 **Sanford's Arrowhead**

27 Sanford's arrowhead, which has a CRPR of 1B.2, is known from widely scattered locations in the  
 28 North Coast, Klamath ranges, Cascade Range foothills, Central Valley, and South Coast (Turner et al.  
 29 2012). It occurs in freshwater ponds, marshes, streams and ditches with standing or slow-moving  
 30 water (California Department of Fish and Wildlife 2013). Natural community types in the study area  
 31 that provide potential habitat for Sanford's arrowhead are nontidal perennial aquatic and tidal and  
 32 nontidal freshwater perennial emergent wetland (Figure 12-60). Occurrences of Sanford's  
 33 arrowhead have been reported within or abutting CZ 2 (two records), CZ 3 (three records), CZ 4  
 34 (seven records), CZ 5 (10 records), and CZ 6 (one record) (California Department of Fish and  
 35 Wildlife 2013). Threats to Sanford's arrowhead are grazing, development, recreational activities,  
 36 competition with nonnative plants, road widening, and channel alteration (California Native Plant  
 37 Society 2012ss).

### 38 **Marsh Skullcap**

39 Marsh skullcap, which has a CRPR of 2.2, occurs in the northern Sierra Nevada and Modoc Plateau  
 40 (Olmstead 2012 p. 856). Disjunct populations have been reported from the Delta (California  
 41 Department of Fish and Game 2013). It occurs in marshes, wet meadows, and other wetland  
 42 communities, often on streambanks (Olmstead 2012 p. 856, California Department of Fish and

1 Wildlife 2013). Natural community types in the study area that provide potential habitat for marsh  
 2 skullcap consist of tidal and nontidal freshwater perennial emergent wetland and valley/foothill  
 3 riparian (Figure 12-60). Marsh skullcap occurrences have been reported in CZ 4 (one record), CZ 5  
 4 (two records), and CZ 6 (three records) (California Department of Fish and Wildlife 2013). Potential  
 5 threats include hydrology alteration (California Native Plant Society 2012tt).

#### 6 **12.1.4 Invasive and Noxious Plant Species**

7 This section discusses the applications of the terms *invasive plants* and *noxious weeds*, defines  
 8 invasive plants for the purposes of this EIR/EIS chapter, provides general discussion on the effects  
 9 of invasive plants on native species and natural communities, and identifies the invasive species that  
 10 primarily affect the natural communities in the study area. The invasive species discussed below  
 11 may affect more than one natural community. Information about the role of invasive plants as  
 12 stressors to native fisheries is provided in Chapter 11, *Fish and Aquatic Resources*.

##### 13 **12.1.4.1 Definitions**

14 The study area contains both aquatic and terrestrial plant species that have been designated as  
 15 invasive plants and/or noxious weeds. Although these two descriptive terms are sometimes used  
 16 interchangeably, it is important to note that there are implications associated with the use of each  
 17 term. The term noxious weed is a designation used by government agencies, such as USDA and the  
 18 California Department of Food and Agriculture (CDFA), for plant species that have been identified as  
 19 pests by law or regulation. Invasive plants may be considered as such from a scientific perspective  
 20 because of their ability to spread to areas that are far from their point of introduction (Richardson et  
 21 al. 2000: 93). Plant species can also be identified as invasive from a political perspective through  
 22 formal recognition by non-governmental organizations, such as the California Invasive Plant Council,  
 23 which maintains a list of invasive plants that threaten California's wildlands. For the purpose of this  
 24 EIR/EIS, invasive plants are species that have been identified as noxious weeds by USDA or CDFA, or  
 25 as invasive plants by the California Invasive Plant Council (Cal-IPC) (California Invasive Plant  
 26 Council 2006 and 2007; California Department of Food and Agriculture 2010; U.S. Department of  
 27 Agriculture 2012).

##### 28 **12.1.4.2 General Effects on Native Species and Natural Communities**

29 According to the California Department of Fish and Game's *California Aquatic Invasive Species*  
 30 *Management Plan*, invasive species threaten the diversity or abundance of native species through  
 31 competition for resources, predation, parasitism, hybridization with native populations,  
 32 introduction of pathogens, or physical or chemical alteration of the invaded habitat (California  
 33 Department of Fish and Game 2008a:ix). Invasive plants can change the invaded habitat by altering  
 34 fire regimes, hydrology (e.g., sedimentation and erosion), light availability, nutrient cycling, and soil  
 35 chemistry (California Invasive Plant Council 2006:1). Unlike the native plants they displace, many  
 36 invasive plant species do not provide the food, shelter, or other habitat components on which many  
 37 native fish and wildlife species depend. Invasive species also have the potential to harm human  
 38 health and the economy by adversely affecting natural ecosystems, water delivery, flood protection  
 39 systems, recreation, agricultural lands, and developed areas (California Department of Fish and  
 40 Game 2008a: ix, xi).

### 12.1.4.3 Invasive Plant Species in Natural Communities

The six counties that overlap with the study area contain more than 250 plants that have been identified as invasive by Cal-IPC (Calflora 2012). Invasive species are present in all of the natural communities in the study area. A discussion of the invasive species that primarily affect each natural community is provided below.

#### Tidal Perennial Aquatic

Invasive plants have exhibited a pronounced negative effect on the tidal perennial aquatic natural community and the special-status species that inhabit it. Water hyacinth and Brazilian waterweed are the two most well-studied aquatic invasive plant species in this natural community. Additional information about the role of aquatic invasive plants as stressors to native fisheries is provided in Chapter 11, *Fish and Aquatic Resources*.

Water hyacinth, a floating perennial, has been designated as a “C”<sup>2</sup> weed by CDFA and has a “High”<sup>3</sup> weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food and Agriculture 2010). Water hyacinth is distributed nearly worldwide; it occurs throughout California but the highest density of reported occurrences is in the Delta (DiTomaso and Healy 2003: 52–54; California Invasive Plant Council 2012). Water hyacinth has a high growth rate in favorable conditions and forms dense, floating mats that clog waterways, displaces native flora and fauna, supports habitat for mosquitoes, and changes the amount of dissolved oxygen, pH, and temperature in affected waters (DiTomaso and Healy 2003: 52–54). Water hyacinth reproduces by seeds and vegetatively via stolons; dispersal occurs through water (e.g., flooding) and human activities (e.g., fishing and boating) or by sticking to the feathers or feet of waterfowl (DiTomaso and Healy 2003: 52–54).

Brazilian waterweed, a submerged perennial, has also been designated as a ‘C’ weed by CDFA and has a ‘High’ weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food and Agriculture 2010). Brazilian waterweed occurs throughout the U.S.; most of the reported occurrences in California are in northern California, particularly in the Delta (California Invasive Plant Council 2012). Brazilian waterweed forms dense stands or subsurface mats that displace native flora and fauna, restrict water flow, increase flooding, clog pumps and boat propellers, and decrease recreational use of waterbodies (DiTomaso and Healy 2003: 96–105). Brazilian waterweed reproduces vegetatively by stolons and stem fragments; dispersal occurs through water, waterfowl, and human activities (e.g., fishing and boating) (DiTomaso and Healy 2003: 96–105).

South American spongeplant, a submerged aquatic perennial, is a more recently identified aquatic invasive plant threat. South American spongeplant, which was identified in the Delta in 2008, has been designated by CDFA as an “A” rated pest<sup>4</sup>. South American spongeplant has the capacity to

<sup>2</sup> State-endorsed holding action and eradication only when found in a nursery; action related to halt the spread outside nurseries is at the discretion of the county agricultural commissioner.

<sup>3</sup> Species that have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure; their reproductive biology and other attributes facilitate moderate to high dispersal rates and establishment (California Invasive Plant Council 2006:3).

<sup>4</sup> An “A” rated invasive plant is a pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment.

1 rapidly disperse, cover large areas of open water, degrade fish and wildlife habitat, and interfere  
 2 with pumping and irrigation systems. South American spongeplant reproduces vegetatively and by  
 3 seeds; dispersal is facilitated by wind, currents, tidal action, waterfowl, and human activities (e.g.,  
 4 boating). (Anderson and Akers 2011: 4, 5).

## 5 **Tidal Mudflat**

6 There are no available data regarding the impacts of nonnative invasive species on this community.  
 7 Where tidal mudflat exists within the valley/foothill riparian natural community, problematic plant  
 8 species are likely to include giant reed and perennial pepperweed. Additionally, water hyacinth  
 9 (discussed above) seedlings frequently establish in mud along shorelines with fluctuating water  
 10 levels (DiTomaso and Healy 2003: 52–54).

11 Giant reed is a perennial grass that has been designated as a “B”<sup>5</sup> weed by CDFG and has a “High”  
 12 weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food  
 13 and Agriculture 2010). Giant reed occurs in river valleys in central and northern California, in the  
 14 San Francisco Bay area, and is spreading in the north coast (California Invasive Plant Council 2012).  
 15 Giant reed, which can tolerate some salinity, forms dense monocultures that displace native flora,  
 16 reduce wildlife habitat, amplify siltation and flooding, and increase the susceptibility of riparian  
 17 areas to fire due to its high flammability. Giant reed reproduces vegetatively from rhizomes, rhizome  
 18 fragments, and stem fragments (DiTomaso and Healy 2003: 254–262). Giant reed is spreading in  
 19 tidal areas, where it frequently occurs on the backside of levees adjacent to sloughs (Vaghti and  
 20 Keeler-Wolf 2004: 35).

21 Perennial pepperweed, a perennial, has also been designated as a “B” weed by CDFG and has a  
 22 “High” weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of  
 23 Food and Agriculture 2010). Perennial pepperweed occurs throughout the western United States  
 24 and is widespread in California (DiTomaso and Healy 2003: 171–175; California Invasive Plant  
 25 Council 2012). Perennial pepperweed can tolerate saline and alkaline conditions and forms dense  
 26 colonies that displace native flora (DiTomaso and Healy 2003: 171–175). Perennial pepperweed  
 27 reproduces by seed and vegetatively by creeping roots and root fragments (DiTomaso and Healy  
 28 2003: 171–175).

## 29 **Tidal Brackish Emergent Wetland**

30 Invasive plants have exerted detrimental effects on the tidal brackish emergent wetland and the  
 31 special-status species that occur there. The most well-studied invasive plant species in this natural  
 32 community is perennial pepperweed (also discussed above). Other invasive plants that can  
 33 negatively affect this natural community are fennel, giant reed (discussed above), pampas grass,  
 34 barbglass, and rabbitsfoot grass.

35 Vegetation mapping studies in Suisun Marsh and the San Francisco Estuary found that perennial  
 36 pepperweed occurs most frequently and/or is spreading in tidal wetlands (Vaghti and Keeler-Wolf  
 37 2004:35; Boul et al. 2007: 20; Environmental Science Associates 2007: 6-2). The displacement by  
 38 perennial pepperweed represents a substantial threat to the population sustainability of soft bird’s-

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<sup>5</sup> A “B” rated invasive plant is a pest of known economic or environmental detriment and, if present in California, it is of limited distribution. If found in California, they are subject to state endorsed holding action and eradication only to provide for containment (i.e., when in a nursery). At the discretion of the county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding action.

1 beak, a BDCP covered species that occurs in this natural community (Grewell 2005: 1, 61; U.S. Fish  
2 and Wildlife Service 2009d: 13). Perennial pepperweed is also considered a major threat to Suisun  
3 thistle, a BDCP covered species that occurs only in the salt and brackish marshes within Suisun  
4 Marsh (Fiedler et al. 2007: 211–212; U.S. Fish and Wildlife Service 2009c: 2, 11).

5 Fennel, a perennial herb, has a “High” weed rating from Cal-IPC (California Invasive Plant Council  
6 2006). Fennel occurs throughout California, and dense local populations have been reported in the  
7 San Francisco Bay region, Santa Cruz Island, Palos Verdes peninsula, and Camp Pendleton  
8 (California Invasive Plant Council 2012). Fennel occurs in disturbed areas, particularly ruderal sites  
9 adjacent to fresh or brackish water and on the banks of creeks, estuaries, and bays (Klinger 2000:  
10 198–202). Fennel alters the vegetative structure and composition of natural communities, possibly  
11 by outcompeting native species for resources (Klinger 2000: 198–202). Fennel spreads from root  
12 crowns and seeds that are dispersed by wildlife, humans (e.g., vehicular traffic, clothing), and water  
13 (Klinger 2000: 198–202; California Invasive Plant Council 2012).

14 Pampas grass, a perennial grass, has a “High” weed rating from Cal-IPC (California Invasive Plant  
15 Council 2006). Pampas grass is found in coastal areas, the Coast Ranges, the Central Valley, the  
16 Mojave Desert, and the western Traverse Ranges (California Invasive Plant Council 2012). Pampas  
17 grass, along with the nonnative genotype of common reed, typically colonizes along channels, in the  
18 marsh plain transition zone, and along the upland/marsh transition zone. Pampas grass reproduces  
19 via seeds that are dispersed by wind (California Invasive Plant Council 2012).

20 Additionally, nonnative barbgrass and rabbitsfoot grass threaten the sustainability of soft bird’s-  
21 beak by functioning as ineffective host plants that result in seed mortality (Grewell 2005: 1).

## 22 **Tidal Freshwater Emergent Wetland**

23 The primary invasive plants that affect the tidal freshwater emergent wetland natural community  
24 are perennial pepperweed and giant reed, which are discussed above.

## 25 **Valley/Foothill Riparian**

26 The susceptibility of riparian areas to invasion by invasive plants appears to be strongly determined  
27 by local landscape structure and disturbance regimes for a particular site (Planty-Tabacchi et al.  
28 1996: 604, 605). In the study area, the primary invasive species that can negatively affect the  
29 valley/foothill riparian natural community are giant reed (discussed above), perennial pepperweed  
30 (also discussed above), and red sesbania. Perennial pepperweed can spread rapidly in riparian  
31 floodplain areas (Hogle et al. 2006: 8). Other invasive species that occur in this natural community  
32 are black locust, tamarisk (multiple species), and Himalayan blackberry.

33 Red sesbania has been designated as a “B” weed by CDFA and has a “High” weed rating from Cal-IPC  
34 (California Invasive Plant Council 2006; California Department of Food and Agriculture 2010). Red  
35 sesbania can form dense thickets that displace native flora and fauna (Platenkamp and Hunter 2003:  
36 114). Red sesbania establishes in moist, open substrates in riparian areas, marshes, and the margins  
37 of ponds, canals, and ditches (DiTomaso and Healy 2003: 7). Thickets on channel banks, gravel bars,  
38 and instream islands may also cause a substantial increase in hydraulic roughness (i.e., flooding and  
39 erosion)(Platenkamp and Hunter 2003: 4, 5).

## 1 **Nontidal Perennial Aquatic**

2 The primary invasive plants in the nontidal perennial aquatic natural community are Brazilian  
3 waterweed (discussed above), Eurasian watermilfoil, and water hyacinth (discussed above).

4 Eurasian watermilfoil, a submersed aquatic perennial, has been designated as a “C” weed by CDFA  
5 and has a “High” weed rating from Cal-IPC (California Invasive Plant Council 2006; California  
6 Department of Food and Agriculture 2010). Similar to Brazilian waterweed and water hyacinth,  
7 Eurasian watermilfoil forms thick mats at the water surface that displace native aquatic flora and  
8 fauna, shade aquatic habitat, detract from recreational use of waterways, and clog irrigation pipes  
9 and canals (San Francisco Estuary Institute 2003:11). Eurasian watermilfoil inhabits freshwater  
10 lakes, ponds, and slow-moving canals in northern and central California (California Invasive Plant  
11 Council 2012). Eurasian watermilfoil reproduces by rhizomes, stem fragments, and axillary buds  
12 (DiTomaso and Healy 2003: 93). The dispersal of stem fragments is facilitated by waterfowl,  
13 mechanical harvesting, boating, and dumping aquarium or pond contents (DiTomaso and Healy  
14 2003: 93).

## 15 **Nontidal Freshwater Perennial Emergent Wetland**

16 The primary invasive plants that affect the nontidal freshwater perennial emergent wetland natural  
17 community are Brazilian waterweed, Eurasian watermilfoil, and water hyacinth, which are  
18 discussed above and which form dense mats that clog waterways and displace native flora and  
19 fauna.

## 20 **Alkali Seasonal Wetland Complex**

21 The primary invasive plants that affect or could affect the alkali seasonal wetland complex natural  
22 community in the study area are Italian ryegrass and perennial pepperweed (discussed above).

23 Italian ryegrass has a “Moderate”<sup>6</sup> weed rating from Cal-IPC and is found throughout California  
24 (California Invasive Plant Council 2006; California Invasive Plant Council 2012). Italian ryegrass  
25 forms dense stands in areas adjacent to alkali sinks and appears to have ecotypes that are more  
26 tolerant of the severe conditions in inundated alkali sinks, which could threaten native alkali species  
27 (Dawson et al. 2007: 328, 333). As previously mentioned, perennial pepperweed can tolerate  
28 alkaline conditions (DiTomaso and Healy 2003: 171–175). There are no data describing the effects  
29 of invasive plant species on wildlife species in this natural community.

## 30 **Vernal Pool Complex**

31 The invasive plants in the vernal pool complex invade the pool interiors or the adjacent grasslands.

32 Waxy manna grass is a primary invasive plant in pool interiors. Waxy manna grass occurs throughout  
33 the Central Valley from Shasta County to Fresno County and has a “Moderate” weed rating from Cal-  
34 IPC (California Invasive Plant Council 2012). The invasion of vernal pools by waxy manna grass is

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<sup>6</sup> Species that have substantial and apparent (but typically not severe) ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread (California Invasive Plant Council 2006:3).



1 widespread and was undetected until relatively recently because of taxonomic confusion with a  
2 native species (Gerlach et al. 2009: 92).

3 The primary invaders that have a substantial known or potential effect on grasslands in vernal pool  
4 complexes are perennial pepperweed (also discussed above), yellow starthistle, medusahead,  
5 purple starthistle, barb goatgrass, Italian ryegrass, and Italian thistle (Swiecki and Bernhardt 2002:  
6 34; Witham 2003: 18; Witham 2006: 41–46; Hopkinson et al. 2008: 20–24).

7 Yellow starthistle, an annual herb, has been designated as a “C” weed by CDFA and has a “High”  
8 weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food  
9 and Agriculture 2010). Yellow starthistle displaces native flora and fauna, depletes soil moisture in  
10 annual grasslands, and is toxic to horses (DiTomaso and Gerlach 2000: 103). Yellow starthistle is  
11 widely distributed throughout California and reproduces from seeds; a large individual can generate  
12 almost 75,000 seeds that are primarily transported by human activities (DiTomaso and Gerlach  
13 2000: 103; California Invasive Plant Council 2012).

14 Medusahead, an annual grass, has been designated as a “C” weed by CDFA and has a “High” weed  
15 rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food and  
16 Agriculture 2010). Medusahead is distributed throughout northwestern California and reproduces  
17 through seeds (California Invasive Plant Council 2012). Medusahead negatively affects natural  
18 communities by outcompeting native flora, forming a layer of thatch that thwarts the germination  
19 and survival of native plants, increasing the risk of fire, tying up nutrients, and being palatable to  
20 livestock and native fauna wildlife only at the onset of the growing season (Kan and Pollack 2000:  
21 310, 311).

22 Purple starthistle, an annual, biennial, or perennial herb, has been designated as a “B” weed by CDFA  
23 and has a “Moderate” weed rating from Cal-IPC (California Invasive Plant Council 2006; California  
24 Department of Food and Agriculture 2010). The highest density of purple starthistle occurrences is  
25 in the northern and central Coast Ranges (California Invasive Plant Council 2012). Purple starthistle  
26 reproduces by seeds, frequently displaces desired native vegetation (Randall 2000: 96; California  
27 Invasive Plant Council 2012),

28 Barb goatgrass, an annual grass, has been designated as a “B” weed by CDFA and has a “High” weed  
29 rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food and  
30 Agriculture 2010). The highest density of barb goatgrass occurrences is in the Sierra foothill  
31 grasslands of central California (California Invasive Plant Council 2012). Barb goat grass is  
32 unpalatable to cattle and can wound livestock by embedding in their mouths or eyes (California  
33 Invasive Plant Council 2012). Barb goatgrass reproduces by seed.

34 Italian thistle, an annual or biennial herb grass, has been designated as a “C” weed by CDFA and has  
35 a “Limited”<sup>7</sup> weed rating from Cal-IPC (California Invasive Plant Council 2006; California  
36 Department of Food and Agriculture 2010). Italian thistle has been reported throughout the Central  
37 Valley, Sierra foothill grasslands, and along the coast (California Invasive Plant Council 2012). Italian  
38 thistle reproduces by seed, displaces native flora, is generally avoided as forage because of the

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<sup>7</sup> Species that are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic (California Invasive Plant Council 2006:3).

1 spines, and has the potential to spread grass fires to tree canopies in oak savannah (Bossard and  
2 Lichti 2000:88).

### 3 **Managed Wetland**

4 The primary invasive species that affect managed wetlands are comparable to those discussed  
5 above for tidal brackish emergent wetland and tidal freshwater emergent wetland natural  
6 communities.

### 7 **Other Natural Seasonal Wetland**

8 The invasive species that primarily affect the other natural seasonal wetland community are waxy  
9 mannagrass, Italian ryegrass, and perennial pepperweed, which are discussed above (Hogle et al.  
10 2006; Dawson et al. 2007; Gerlach et al. 2009).

### 11 **Grassland**

12 The primary invasive species that affect the grassland natural community in the study area are  
13 comparable to those that occur in grassland in vernal pool complexes (discussed above).

### 14 **Inland Dune Scrub**

15 The invasive species found in the inland dune scrub in the study area are typically dominated by  
16 ripgut brome, yellow starthistle, telegraph weed, wild lettuce, and wild radish. Ripgut brome, yellow  
17 starthistle (also discussed above), vetch (multiple species), and Russian thistle are the invasive  
18 plants of primary concern at Antioch Dunes NWR. The spread of invasive plants is the major threat  
19 to the federally listed Antioch Dunes evening primrose and Contra Costa wallflower because  
20 invasive plants outcompete native vegetation for resources (e.g., sunlight, water) and stabilize the  
21 remaining dune areas; the Antioch Dunes evening primrose needs regular disturbance for  
22 germination. Additionally, the spread of ripgut brome and yellow starthistle on the refuge reduces  
23 the amount of buckwheat available to the federally listed Lange's metalmark butterfly. (U.S. Fish and  
24 Wildlife Service 2001:24, 28, 31, 42).

25 Ripgut brome, an annual grass, has a "Moderate" rating from Cal-IPC and is distributed throughout  
26 California (California Invasive Plant Council 2006 and 2007; California Invasive Plant Council 2012).  
27 Ripgut brome displaces native vegetation and increases wildfire frequency because of its  
28 flammability during the dry season (California Invasive Plant Council 2012). Ripgut brome spreads  
29 from seeds that are dispersed through the movement of water and soil or carried by animals, people,  
30 and equipment (California Invasive Plant Council 2012).

31 Russian thistle, an annual herb, has been designated as a "C" weed by CDFA and has a "Limited"  
32 weed rating from Cal-IPC (California Invasive Plant Council 2006 and 2007; California Department  
33 of Food and Agriculture 2010). Russian thistle occurs throughout California and can be a fire hazard,  
34 impede traffic, and act as the host plant for the beet leaf-hopper, an agricultural pest (California  
35 Invasive Plant Council 2012). Russian thistle spreads via seeds.

### 36 **Cultivated Lands**

37 Cultivated lands in the study area consist primarily of crops that are intermixed with small areas of  
38 natural habitat, such as riparian corridors or wetlands. Past and ongoing ground disturbance (e.g.,  
39 tillage and irrigation) associated with cultivated lands facilitate the establishment of invasive plants,

1 which colonize the perimeter of active agricultural fields and rapidly germinate in fallow fields.  
 2 Maintenance activities, such as herbicide application and regular cultivation, are implemented in  
 3 active fields to reduce the effects of invasive plants. Invasive plants that are commonly found in  
 4 cultivated lands are wild radish, bindweed, fennel, field mustard, and Bermuda grass.

## 5 **12.2 Regulatory Setting**

6 Specific federal, state and local laws, regulations, policies, executive orders and plans that affect, or  
 7 have the potential to affect how terrestrial biological resources are impacted, used or managed  
 8 during implementation of the BDCP are discussed in this section.

### 9 **12.2.1 Federal Plans, Policies, Regulations, and Executive** 10 **Orders**

#### 11 **12.2.1.1 Sections 404 and 401 of the Clean Water Act**

12 Section 404 of the CWA requires a project applicant to obtain a permit from USACE before engaging  
 13 in any activity that involves any discharge of dredged or fill material into waters of the United States,  
 14 including wetlands. Section 401 of the CWA is administered by state agencies and is discussed below  
 15 under state plans, policies, and regulations. Waters of the United States is defined to encompass  
 16 navigable waters of the United States; interstate waters; all other waters where their use,  
 17 degradation, or destruction could affect interstate or foreign commerce; tributaries to any of these  
 18 waters; and wetlands that meet any of these criteria or are adjacent to any of these waters or their  
 19 tributaries. Wetlands are defined under Section 404 as those areas that are inundated or saturated  
 20 by surface water or groundwater at a frequency and duration sufficient to support, and that under  
 21 normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated  
 22 soil conditions. Wetlands must meet three delineation criteria to be subject to jurisdiction by USACE.

- 23 • They support hydrophytic vegetation (i.e., plants that grow in saturated soil).
- 24 • They have hydric soil types (i.e., soils that are wet or moist enough to develop anaerobic  
 25 conditions).
- 26 • They have wetland hydrology.

27 USACE would likely have jurisdiction under Section 404 over actions associated with some BDCP  
 28 covered activities. Because the USACE jurisdiction and scope would not include the entire BDCP,  
 29 USACE would likely make multiple permit decisions over the course of implementing the various  
 30 elements of the BDCP (regional general permits or individual permits). As an example, it is expected  
 31 that implementation of the BDCP water conveyance facility construction (CM1) would require  
 32 permitting under the CWA. Permitting CM1 would likely be accomplished in a multi-step process as  
 33 follows. First, USACE would adopt the BDCP EIR/EIS pursuant to 40 Code of Federal Regulation  
 34 (CFR) Section 1506.3 and complete a Record of Decision (ROD) setting forth its statutory  
 35 requirements and covered activities falling under the USACE jurisdiction. The ROD would likely note  
 36 that the EIR/EIS would be used for current and future permit decisions (noting that subsequent  
 37 NEPA analysis may be necessary). The ROD would also likely note that the BDCP EIR/EIS would  
 38 provide a context for alternatives evaluated under the CWA 404(b)(1) Guidelines, and would discuss  
 39 the use of permit phases for implementation of CM1. After USACE received a complete application

1 for CM1, USACE would issue a Public Notice describing the permit phases for CM1, the USACE  
 2 approach for making decisions under CWA Section 404 and the Rivers and Harbors Act Section 10  
 3 and Section 14 (or “408 program”), and would describe those construction phases for which  
 4 sufficient detail is present to allow a final permit decision. The initial permit application would  
 5 include an analysis of alternatives consistent with the 404(b)(1) Guidelines for the entire CM1  
 6 project, regardless of construction phase. At that point, USACE may make a preliminary  
 7 determination regarding the Least Environmentally Damaging Practicable Alternative (LEDPA)  
 8 under the Guidelines for the whole of CM1 that meets the overall project purpose. A final  
 9 compensatory mitigation plan would be submitted for CM1 that offsets unavoidable impacts on  
 10 wetlands or other waters of the United States, and USACE would determine whether the Plan is  
 11 sufficient under 33 CFR Part 332. For each CM1 phase, USACE would prepare a decision document  
 12 (EA FONSI or ROD) and would make any necessary additional findings regarding NEPA compliance,  
 13 the CWA Section 404(b)(1) analysis, public interest review and Section 408 permission, if  
 14 applicable.

15 Sections 404 and 401 of the CWA are relevant to terrestrial biological resources in the study area  
 16 because wetlands and waters of the United States provide habitat to both special-status and  
 17 common terrestrial species.

### 18 **12.2.1.2 Endangered Species Act**

19 Pursuant to the federal ESA, USFWS and NMFS have authority over projects that may result in take  
 20 of a species listed as threatened or endangered under the act. *Take* is defined under the ESA, in part,  
 21 as killing, harming, or harassing. Under federal regulations, take is further defined to include habitat  
 22 modification or degradation that results, or is reasonably expected to result, in death or injury to  
 23 wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or  
 24 sheltering. If a likelihood exists that a project would result in take of a federally listed species, either  
 25 an incidental take permit, under Section 10(a) of the ESA, or a federal interagency consultation,  
 26 under Section 7 of the ESA, is required. Section 7 of the federal ESA also provides the USFWS  
 27 authority to regulate the adverse modification of critical habitat for listed species, when the action  
 28 requires federal funding or approval. The potential for federally listed wildlife and plant species to  
 29 occur in the study area is discussed above in Section 12.1.3, *Special-Status Species*. A discussion of  
 30 critical habitat in the study area is presented in Section 12.1.3.1.

### 31 **12.2.1.3 Fish and Wildlife Coordination Act**

32 The Fish and Wildlife Coordination Act (FWCA) ensures that fish and wildlife receive equal  
 33 consideration with water resources development during planning and construction of federal water  
 34 projects by requiring that the federal agencies consult with USFWS and the state wildlife resources  
 35 agency before the waters of any stream or other body of water are impounded, diverted, deepened  
 36 or otherwise controlled or modified. The FWCA requires that the views of USFWS and the state  
 37 agency be considered when evaluating impacts and determining mitigation needs. NEPA regulations  
 38 further require that an EIS meet the consultation requirements of the FWCA. Therefore, the FWCA  
 39 consultation requirements for the BDCP are being satisfied through the EIR/EIS process. Terrestrial  
 40 biological resources are a principal focus of the FWCA coordination occurring for the BDCP  
 41 conservation planning process.

#### 1 **12.2.1.4 CALFED Bay-Delta Program**

2 Federal and state agencies developed a regulatory and management strategy to implement a long-  
3 term comprehensive plan to restore ecological health and improve water management for beneficial  
4 uses of the Bay-Delta system. The federal agencies involved in the CALFED Bay-Delta Program are  
5 the U.S. Bureau of Reclamation (Reclamation), USFWS, NMFS, USACE, and the U.S. Environmental  
6 Protection Agency (EPA). The state agencies involved in the program are CDFW, DWR, and the State  
7 Water Resources Control Board (State Water Board) (CALFED Bay-Delta Program 2000).

8 In August of 2000, the CALFED Record of Decision was signed and included eleven program  
9 elements to improve the health and sustainability of the Bay-Delta ecosystem so that it may become  
10 a more reliable source of drinking water and irrigation water for 25 million Californians and 7.5  
11 million acres of agricultural land. Program goals, milestones, and actions are outlined in the CALFED  
12 Multi-Species Conservation Strategy. CDFW and its federal partner agencies are completing a  
13 Conservation Strategy for Stage 2 of ERP (through 2030). Although the CALFED ROD remains in  
14 effect and many of the state, federal and local projects begun under CALFED continue, future  
15 direction and administration must be coordinated through the Delta Stewardship Council and be  
16 consistent with the pending Delta Plan, which is discussed below in State Plans, Policies, and  
17 Regulations.

18 The CALFED program has four objectives.

- 19 ● Provide optimal water quality.
- 20 ● Improve and increase aquatic and terrestrial habitats, and improve ecological functions in the  
21 Bay-Delta Estuary to support sustainable populations of diverse plant and animal species.
- 22 ● Reduce shortages between water supplies and current and projected demands on the system.
- 23 ● Reduce the risk of failure of Delta levees that protect land use and associated economic  
24 activities, water supply, and other infrastructure and ecosystems.

#### 25 **12.2.1.5 Migratory Bird Treaty Act**

26 The Migratory Bird Treaty Act (MBTA) domestically implements a series of international treaties  
27 that provide for migratory bird protection. The MBTA authorizes the Secretary of the Interior to  
28 regulate the taking of migratory birds. The act further provides that it shall be unlawful, except as  
29 permitted by regulations, "to pursue, take, or kill any migratory bird, or any part, nest or egg of any  
30 such bird..." (Title 16, USC, Section 703). This prohibition includes both direct and indirect acts,  
31 although harassment and habitat modification are not included unless they result in direct loss of  
32 birds, nests, or eggs. The current list of species protected by the MBTA can be found in the March 1,  
33 2010 Federal Register (75 FR 9281). This list contains several hundred species including essentially  
34 all native birds. Permits for take of nongame migratory birds can be issued only for specific  
35 activities, such as scientific collecting, rehabilitation, propagation, education, taxidermy, and  
36 protection of human health and safety and of personal property. USFWS publishes a list of birds of  
37 conservation concern (BCC) to identify migratory nongame birds that are likely to become  
38 candidates for listing under ESA without additional conservation actions. The BCC list is intended to  
39 stimulate coordinated and collaborative conservation efforts among federal, state, tribal, and private  
40 parties. Implementation of the BDCP has the potential to both positively and negatively affect bird  
41 species protected under the MBTA.

### 1 **12.2.1.6 Rivers and Harbors Act**

2 Under Section 10 of the Rivers and Harbors Act of 1899, the construction of structures in, over, or  
3 under, excavation of material from, or deposition of material into navigable waters are regulated by  
4 USACE. Navigable waters of the United States are defined as those waters subject to the ebb and flow  
5 of the tide shoreward to the mean high-water mark or those that are currently used, have been used  
6 in the past, or may be susceptible for use to transport interstate or foreign commerce. A Letter of  
7 Permission or permit from USACE is required prior to any work begun within navigable waters. The  
8 anticipated approach for Section 10 permitting is outlined in Section 12.2.1.1 above. Numerous  
9 terrestrial species that are addressed in the BDCP and this EIR/EIS require navigable waters for a  
10 part of their habitat.

### 11 **12.2.1.7 Comprehensive Conservation Plans for National Wildlife Refuges**

12 USFWS is directed to develop comprehensive conservation plans (CCP) to guide the management  
13 and resource use for each refuge of the National Wildlife Refuge System under requirements of the  
14 National Wildlife Refuge Improvement Act of 1997. Refuge planning policy also directs the process  
15 and development of CCPs. A CCP provides a description of the desired future conditions and long-  
16 range guidance necessary for meeting refuge purposes. It also guides management decisions and  
17 sets forth strategies for achieving refuge goals and objectives within a 15-year timeframe. The  
18 USFWS adopted a CCP for Stones Lakes NWR in 2007. Many of the species analyzed in the BDCP and  
19 this EIR/EIS are affected by the management practices of the Stone Lakes NWR.

### 20 **12.2.1.8 North American Waterfowl Management Plan and Central Valley** 21 **Joint Venture**

22 In 1986, the United States and Canada signed the North American Waterfowl Management Plan  
23 (NAWMP). It provides a broad framework for waterfowl management and includes  
24 recommendations for wetland and upland habitat protection, restoration, and enhancement.  
25 Implementing the NAWMP is the responsibility of designated joint ventures. The Central Valley  
26 Habitat Joint Venture formally organized in 1988 as one of the original six priority joint ventures  
27 formed under the NAWMP. Renamed the Central Valley Joint Venture in 2004, the Management  
28 Board now oversees the membership of 21 federal and state agencies and conservation  
29 organizations. The organization's 2006 Implementation Plan broadens the scope of conservation  
30 activities to include objectives for shorebirds, waterbirds, and riparian songbirds. The management  
31 objectives of the NAWMP affect several of the bird species analyzed in the BDCP and this EIR/EIS.

### 32 **12.2.1.9 Federal Noxious Weed Act and Code of Federal Regulations (Title 7,** 33 **Part 360)**

34 These laws and regulations are primarily concerned with the introduction of federally designated  
35 noxious weed plants or seeds across the United States' international borders. The Federal Noxious  
36 Weed Act (7 USC Sections 2801–2813) also regulates the interstate movement of designated  
37 noxious weeds under USDA's permit system. This act would be a factor in any decisions to import  
38 construction materials and equipment as part of CM1, including aggregate, from out-of-state or out-  
39 of-country.

### 1 **12.2.1.10 Executive Order 11990: Protection of Wetlands**

2 Executive Order 11990 (May 24, 1977) established the protection of wetlands and riparian systems  
 3 as the official policy of the federal government. The executive order requires all federal agencies to  
 4 consider wetland protection as an important part of their policies, take action to minimize the  
 5 destruction, loss, or degradation of wetlands, and preserve and enhance the natural and beneficial  
 6 values of wetlands. Most of the terrestrial habitats considered in this chapter are wetlands or are  
 7 immediately adjacent to wetlands.

### 8 **12.2.1.11 Executive Order 13112: Invasive Species**

9 Executive Order 13112 (February 3, 1999) directs all federal agencies to prevent and control the  
 10 introduction and spread of invasive nonnative species in a cost-effective and environmentally sound  
 11 manner to minimize their effects to economic, ecological, and human health. The executive order  
 12 was intended to build upon existing laws, such as NEPA, the Nonindigenous Aquatic Nuisance  
 13 Prevention and Control Act, the Lacey Act, the Plant Pest Act, the Federal Noxious Weed Act, and the  
 14 ESA. The executive order established a national Invasive Species Council composed of federal  
 15 agencies and departments, as well as a supporting Invasive Species Advisory Committee composed  
 16 of state, local, and private entities. The council and advisory committee oversee and facilitate  
 17 implementation of the executive order, including preparation of the National Invasive Species  
 18 Management Plan. Federal activities addressing invasive aquatic species are now coordinated  
 19 through this council and through the National Aquatic Nuisance Species Task Force. Federal  
 20 agencies with any decisionmaking authority over the BDCP and its implementation must ensure that  
 21 construction and restoration actions do not result in the spread of invasive species into terrestrial  
 22 habitats.

### 23 **12.2.1.12 Executive Order 13186: Responsibilities of Federal Agencies to** 24 **Protect Migratory Birds**

25 Executive Order 13186 (January 10, 2001) directs federal agencies that have, or are likely to have, a  
 26 measurable negative effect on migratory bird populations to develop and implement a  
 27 memorandum of understanding with USFWS to promote the conservation of migratory bird  
 28 populations. The various memoranda of understanding include implementation actions and  
 29 reporting procedures for each agency's formal planning process, such as preparation of resource  
 30 management plans. The BDCP is a resource management plan with the potential to affect migratory  
 31 birds and their habitat in the Plan Area.

### 32 **12.2.1.13 Executive Order 13443: Facilitation of Hunting Heritage and Wildlife** 33 **Conservation**

34 The purpose of Executive Order 13443 (August 16, 2007) is to direct federal agencies that maintain  
 35 programs and activities having a measurable effect on public land management, outdoor recreation,  
 36 and wildlife management to facilitate the expansion and enhancement of hunting opportunities, and  
 37 the management of game species and their habitat. Proposed BDCP actions have the potential to  
 38 affect game species in the Plan Area, particularly waterfowl and upland game birds.

## 1 **12.2.2 State Plans, Policies, and Regulations**

### 2 **12.2.2.1 California Endangered Species Act**

3 CESA (California Fish and Game Code Sections 2050–2116) states that all native species or  
4 subspecies of a fish, amphibian, reptile, mammal, or plant and their habitats that are threatened with  
5 extinction and those experiencing a significant decline that, if not halted, would lead to a threatened  
6 or endangered designation will be protected or preserved.

7 Under Section 2081 of the Fish and Game Code, a permit from CDFW is required for projects that  
8 could result in the take of a species that is state-listed as threatened or endangered. Under CESA,  
9 *take* of a species means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch  
10 capture, or kill (California Fish and Game Code, Section 86). The definition does not include *harm* or  
11 *harass*, as the definition of take under ESA does. As a result, the threshold for take under CESA is  
12 higher than that under ESA. For example, habitat modification is not necessarily considered take  
13 under CESA. The potential for state-listed wildlife and plant species to occur in areas that could be  
14 affected by the BDCP is discussed above in Special-Status Species.

### 15 **12.2.2.2 Fully Protected Species**

16 Fish and Game Code Sections 3511, 3513, 4700, and 5050 pertain to fully protected wildlife species  
17 (birds in Sections 3511 and 3513, mammals in Section 4700, and reptiles and amphibians in Section  
18 5050) and strictly prohibit the take of these species. CDFW cannot issue a take permit for fully  
19 protected species, except under narrow conditions for scientific research or the protection of  
20 livestock, or if an NCCP has been adopted. The BDCP has the potential to affect seven fully protected  
21 species (six birds and the salt marsh harvest mouse).

### 22 **12.2.2.3 California Native Plant Protection Act**

23 Fish and Game Code Sections 1900–1913 codify the Native Plant Protection Act of 1977 (NPPA),  
24 which is intended to preserve, protect, and enhance endangered or rare native plants in the state.  
25 Under Section 1901, a species is *endangered* when its prospects for survival and reproduction are in  
26 immediate jeopardy from one or more causes. A species is *rare* when, although not threatened with  
27 immediate extinction, it exists in such small numbers throughout its range that it may become  
28 endangered if its present environment worsens. The NPPA gave the California Fish and Game  
29 Commission the power to designate native plants as endangered or rare, and the act protected  
30 endangered and rare plants from take. According to CDFW, a CESA Section 2081 permit for  
31 incidental take of listed threatened and endangered plants from all activities is required, except for  
32 activities specifically authorized by the NPPA. Because rare plants are not included under CESA,  
33 mitigation measures for impacts on rare plants are specified in a formal agreement between CDFW  
34 and the project proponent.

35 CNPS has developed and maintains lists of plants of special concern in California, as described above  
36 under Special-Status Species. CNPS-listed species have no formal legal protection, but the values and  
37 importance of these lists are widely recognized. Plants listed on CNPS Lists 1A, 1B, and 2 meet the  
38 definitions of endangered under Fish and Game Code Section 1901 and may qualify for state listing.  
39 Therefore, for purposes of this analysis, they are considered rare plants pursuant to Section 15380  
40 of CEQA.



#### 12.2.2.4 Section 1600 of the California Fish and Game Code

Sections 1600–1603 of the Fish and Game Code state that it is unlawful for any person or agency to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources, or to use any material from the streambeds, without first notifying CDFW. A Lake and Streambed Alteration Agreement must be obtained if effects are expected to occur. The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks, and that supports wildlife, fish, or other aquatic life. This definition includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. CDFW’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. The information contained in this chapter could be used in future applications for streambed alteration agreements associated with the construction elements of the BDCP conservation measures.

#### 12.2.2.5 Sections of the California Fish and Game Code Pertaining to Invasive Species

CDFW is one of the primary state agencies responsible for state efforts to prevent the introduction of new invasive species, detect and respond to introductions when they occur, and manage and prevent the spread of established invasive species. This responsibility is derived from California Fish and Game Code Sections 2116–2127, 2150–2157, 2185–2195, 2270–2272, 2300–2302, 6400–6403, and 15000 et seq. These sections relate to the importation, transfer, and possession of live wild animals, aquatic plants, and fish into the state; the placement of live aquatic animals and plants in state waters; and the operation of aquaculture industries. The various construction elements of the BDCP have the potential to introduce or spread invasive species into natural habitats of the species considered in this chapter.

#### 12.2.2.6 Natural Communities Conservation Planning Act

Fish and Game Code Sections 2800–2835 detail the state’s policies on the conservation, protection, restoration, and enhancement of the state’s natural resources and ecosystems. The intent of the legislation is to provide for conservation planning as an officially recognized policy that can be used as a tool to eliminate conflicts between the protection of natural resources and the need for growth and development. In addition, the legislation promotes conservation planning as a means of coordination and cooperation among private interests, agencies, and landowners, and as a mechanism for multispecies and multihabitat management and conservation. One conservation plan adopted pursuant to the Natural Communities Conservation Planning Act (NCCPA) falls within the study area (the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan, which is discussed below) and at least two other NCCPs are in the planning stages. The BDCP is being prepared in compliance with the NCCPA. The development of NCCPs is an alternative to obtaining take authorization under Section 2081 of the Fish and Game Code.

#### 12.2.2.7 Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Act definition, *waters of the state* are “any surface water or groundwater, including saline waters, within the boundaries of the state.” Although all waters of the United States that are within the borders of California are also waters of the state, the reverse is not true. Therefore, California retains authority to regulate discharges of waste into any waters of the state,

1 regardless of whether USACE has concurrent jurisdiction under CWA Section 404, and defines  
2 *discharges to receiving waters* more broadly than the CWA does.

3 Waters of the state fall under the jurisdiction of the nine Regional Water Quality Control Boards  
4 (RWQCBs). Under this act, each RWQCB must prepare and periodically update water quality control  
5 basin plans. Each basin plan sets forth water quality standards for surface water and groundwater,  
6 as well as actions to control nonpoint and point sources of pollution. California Water Code Section  
7 13260 requires any person discharging waste, or proposing to discharge waste, in any region that  
8 could affect the waters of the state to file a report of discharge (an application for waste discharge  
9 requirements [WDRs]) with the applicable RWQCB. California Water Code Section 13050 authorizes  
10 the State Water Board and the affiliated RWQCB to regulate biological pollutants. Aquatic invasive  
11 plants discharged to receiving waters are an example of this kind of pollutant. Construction and  
12 restoration activities associated with the BDCP that may discharge wastes into the waters of the  
13 state must meet the discharge control requirements of the Porter-Cologne Act.

#### 14 **12.2.2.8 California Food and Agriculture Code**

15 More than 30 different sections of the California Food and Agriculture Code pertain to the state's  
16 mandate to prevent the introduction and spread of injurious animal pests, plant diseases, and  
17 noxious weeds. Most of these statutes and their associated regulations (Title 3 of the California Code  
18 of Regulations [CCR]) are contained in Food and Agriculture Code Sections 403, 461, 5004, 5021–  
19 5027, 5301–5310, 5321–5323, 5401–5404, 5421, 5430–5432, 5434, 5761–5763, 7201, 7206–7207,  
20 and 7501–7502. These codes describe procedures and regulations concerning: plant quarantines,  
21 regulation of noxious weed seed, emergency pest eradications to protect agriculture, pests as public  
22 nuisances, vectors of infestation and infection, the sale, transport and propagation of noxious weeds,  
23 and the protection of native species and forests from weeds. CDFA enforces most of these statutes  
24 and their relevant regulations (California Department of Fish and Game 2008a). Construction and  
25 restoration activities associated with the BDCP must meet the pest and vector control requirements  
26 of this code.

#### 27 **12.2.2.9 Harbors and Navigation Code**

28 Article 2, Section 64 of the Harbors and Navigation Code designates the California Department of  
29 Boating and Waterways (CDBW) as the lead state agency to cooperate with other state, local, and  
30 federal agencies to control water hyacinth, Brazilian waterweed, and South American spongeplant in  
31 the Delta, its tributaries, and Suisun Marsh. Any BDCP-related activities to restore or modify Plan  
32 Area habitats must be undertaken in cooperation with CDBW to avoid the spread of these invasive  
33 plants.

#### 34 **12.2.2.10 Delta Protection Act of 1992**

35 The Delta Protection Act of 1992 (Water Code Section 12220) established the Delta Protection  
36 Commission (DPC) to prepare and oversee a comprehensive Land Use and Resources Management  
37 Plan (LURMP) for the Delta Primary Zone. The Primary Zone consists of the lands in the Delta's  
38 central portion that were not within either the urban limit line or sphere of influence line of any  
39 local government's general plan or studies as of January 1, 1992. The Primary Zone encompasses  
40 487,625 acres (approximately 66% of the statutory Delta) of varied land uses, waterways, and  
41 levees in parts of Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties. The remaining

1 areas of the legal Delta are designated as the Secondary Zone and are not under Commission land  
2 use jurisdiction (Delta Protection Commission 2010).

3 The DPC in 1995 adopted a LURMP for the Primary Zone to address land uses and resource  
4 management—with a particular emphasis on agriculture, which was designated by the Delta  
5 Protection Act as the primary use of this zone—wildlife habitat, and recreation. In 2000, the LURMP  
6 policies were adopted as regulations (Title 14, CCR, Chapter 3, *Regulations Governing Land Use and*  
7 *Resources Management in the Delta*); the plan was revised and reprinted in 2002.

8 The Delta Protection Act was amended in 2009 by the Sacramento-San Joaquin Delta Reform Act (SB  
9 1 X7), which modified the DPC's composition and responsibilities. The DPC has since adopted an  
10 updated LURMP, which became effective on November 6, 2010. It contains policies to protect the  
11 Delta's unique character, expand public access and recreation, and locate new transmission lines  
12 and utilities within existing corridors to minimize impacts (Delta Protection Commission 2010).  
13 These policies are required to be incorporated into the local general plans of the counties with  
14 jurisdiction over portions of the Primary Zone. Local planning decisions may be appealed to DPC for  
15 a determination of consistency with the LURMP. Nothing in the law makes the LURMP binding on  
16 state agencies that are BDCP proponents.

#### 17 **12.2.2.11 Delta Vision Strategic Plan**

18 The Delta Vision Blue Ribbon Task Force (Task Force) was created in 2006 by Executive Order S-17-  
19 06. The Task Force was charged with creating strategies to repair ecological damage to the Delta and  
20 methods for sustaining the Delta in future decades. The Delta Vision Strategic Plan (Strategic Plan)  
21 was approved and adopted unanimously by the Task Force on October 17, 2008 (Governor's Delta  
22 Vision Blue Ribbon Task Force 2008). The Strategic Plan is intended to ensure a reliable water  
23 supply for the two-thirds of California's population that depends, in whole or in part, on water from  
24 the Delta. The vision for the Delta is based on two interdependent goals: restore the Delta, and  
25 create a more reliable water supply.

26 The Task Force determined that creation of a reliable water delivery system could help to restore  
27 the ecosystem. It recommended that the state analyze a two-channel approach to water delivery,  
28 improving the Delta's existing conveyance channel and adding a second channel to carry water to  
29 export pumps. The Task Force also recommended increasing storage capacity and modifying  
30 operations, which would improve water supply reliability.

31 The Task Force further recommended reduced dependence on water from the Delta in order to cut  
32 the risk of a failed Delta conveyance system and lessen risks to the ecosystem. The Strategic Plan  
33 acknowledged that a revitalized Delta ecosystem would require reduced diversions at critical times  
34 (Governor's Delta Vision Blue Ribbon Task Force 2008). The Task Force formulated seven goals,  
35 including establishing a new governing structure, enhancing the Delta's cultural, recreational, and  
36 agricultural values, and promoting statewide water conservation.

#### 37 **12.2.2.12 Delta Stewardship Council**

38 Signed by the governor in 2009, the Sacramento-San Joaquin Delta Reform Act (Water Code Section  
39 85000 et seq.) created a new Delta Stewardship Council (DSC) and gave this body broad oversight of  
40 Delta planning and resource management. The DSC has been tasked with developing and  
41 implementing a long-term, comprehensive management plan (Delta Plan) that emphasizes the  
42 coequal goals of "providing a more reliable water supply for California and protecting, restoring, and

1 enhancing the Delta ecosystem” (Water Code Section 85300(a)) as the foundation for state decisions  
2 regarding Delta management.

3 Among other things, the Reform Act contains three specific mandates for the DSC.

- 4 • Include measures in the Delta Plan to promote statewide water conservation, water use  
5 efficiency, and sustainable use of water, as well as improvements to water conveyance/storage  
6 and operation of both to achieve the coequal goals.
- 7 • Include measures in the Delta Plan that attempt to reduce risks to people, property, and state  
8 interests in the Delta by promoting effective emergency preparedness, appropriate land uses,  
9 and strategic levee investments.
- 10 • Determine whether state or local agency projects are consistent with the Delta Plan.

11 In addition, the Reform Act requires the Delta Plan to cover five topic areas and goals.

- 12 • Increased water supply reliability
- 13 • Restoration of the Delta ecosystem
- 14 • Improved water quality
- 15 • Reduced risks of flooding in the Delta
- 16 • Protection and enhancement of the Delta

17 Although it had a deadline of December 31, 2011 to adopt a Delta Plan, the DSC continued preparing  
18 the plan until the final Delta Plan was adopted on May 16, 2013, and the DSC is still preparing the  
19 associated environmental impact report. Following adoption of the Delta Plan, covered actions are  
20 required to be consistent with the Delta Plan. Additionally, the DSC must incorporate the BDCP into  
21 the approved Delta Plan if the BDCP meets certain requirements. Specifically, CDFW must approve  
22 the BDCP as an NCCP, and CDFW must determine that the BDCP complies with Water Code Section  
23 85320 and that the BDCP has been approved under the ESA as a Habitat Conservation Plan.

#### 24 **12.2.2.13 California Aquatic Invasive Species Management Plan**

25 The California Aquatic Invasive Species Management Plan (CAISMP) provides a comprehensive,  
26 coordinated effort between state agencies and other entities to prevent new invasions, minimize  
27 impacts from established aquatic invasive species, and establish priorities for action statewide.  
28 CAISMP identifies eight primary objectives and actions needed to minimize the harmful effects of  
29 aquatic invasive species on ecosystems, the economy, and human health. An example of the  
30 implementation of CAISMP’s long-term control and management objective in the Delta is CDBW’s  
31 Aquatic Weed Control Program, which primarily focuses on the control of Brazilian waterweed and  
32 water hyacinth. These control practices must be taken into consideration in developing restoration  
33 actions for the terrestrial and aquatic species covered in the BDCP.

#### 34 **12.2.2.14 California Wetlands Conservation Policy**

35 The goals of the California Wetlands Conservation Policy, adopted in 1993 (Executive Order W-59-  
36 93), are “to ensure no overall net loss, and achieve a long-term net gain in the quantity, quality, and  
37 permanence of wetlands acreage and values in California, in a manner that fosters creativity,  
38 stewardship, and respect for private property;” to reduce procedural complexity in the  
39 administration of state and federal wetlands conservation programs; and to make restoration,

landowner incentive programs and cooperative planning efforts the primary focus of wetlands conservation. This policy is consistent with the expansion of wetlands proposed in the BDCP.

### 12.2.2.15 Suisun Marsh Preservation Act and Suisun Marsh Protection Plan

The Nejedly-Bagley-Z'berg Suisun Marsh Preservation Act of 1974 (SB 1981) was designed to protect Suisun Marsh from residential, commercial, and industrial development. The act directed the San Francisco Bay Conservation and Development Commission (BCDC) and CDFW to prepare a protection plan for Suisun Marsh "to preserve the integrity and assure continued wildlife use" of the marsh. The objectives of the protection plan are to preserve and enhance the quality and diversity of the Suisun Marsh's aquatic and wildlife habitats, and to ensure upland areas adjacent to the marsh remain in uses compatible with marsh protection.

In December 1976, BCDC submitted the Suisun Marsh Protection Plan (Protection Plan) to the governor and the legislature. The Protection Plan identifies a Primary Management Area, which encompasses approximately 89,000 acres of bays, sloughs, tidal marsh, wetlands, and lowland grasslands, and a Secondary Management Area, which encompasses approximately 22,500 acres of significant buffer lands (San Francisco Bay Conservation and Development Commission 2007). The Protection Plan is a more specific application of the policies of the San Francisco Bay Plan (Bay Plan) that addresses the unique characteristics of Suisun Marsh. The policies of both the Bay Plan and the Protection Plan apply in the marsh. In the event of a policy conflict between the Bay Plan and the Protection Plan, the policies of the Protection Plan take precedence. The Suisun Marsh Protection Plan was last amended in November 2007.

The Suisun Marsh Preservation Act of 1977 (AB 1717) was enacted to incorporate the findings and policies contained in the Bay Plan into state law. The act designates the BCDC as the state agency with regulatory jurisdiction over Suisun Marsh and calls for the Suisun Resource Conservation District (SRCD) to have responsibility for water management in the marsh.

### 12.2.2.16 Suisun Marsh Preservation Agreement

On March 2, 1987, the Suisun Marsh Preservation Agreement (SMPA) was signed by DWR, CDFW, Reclamation, and SRDC. The purpose of the SMPA was to establish mitigation for impacts on salinity from the SWP, CVP, and other upstream diversions. The SMPA contains these objectives.

- Ensure that Reclamation and DWR maintain a water supply of adequate quantity and quality for managed wetlands within Suisun Marsh. This is to mitigate adverse effects on these wetlands from SWP and CVP operations, as well as a portion of the adverse effects of other upstream diversions.
- Improve Suisun Marsh wildlife habitat on these managed wetlands.
- Define the obligations of Reclamation and DWR necessary to ensure the water supply, distribution, management facilities, and actions necessary to accomplish these objectives.
- Recognize that water users in Suisun Marsh (i.e., existing landowners) divert water for wildlife habitat management within Suisun Marsh.

On June 20, 2005, a revised SMPA was signed to make channel water salinity requirements consistent with the State Water Board's Decision 1641, and to replace additional large-scale water management facilities with landowner water and management activities to meet the SMPA objectives in the western portion of Suisun Marsh. The agencies that are party to this agreement are

1 also participating in development of the BDCP and must ensure that the BDCP is consistent with the  
2 intent to protect wetlands and wildlife in the Suisun Marsh.

### 3 **12.2.2.17 Central Valley Flood Protection Plan**

4 The Central Valley Flood Protection Plan (CVFPP) was approved by the California Flood Protection  
5 Board in June of 2012. The CVFPP provides for a new framework of flood management and flood  
6 risk reduction in both the Sacramento and San Joaquin River Basins. It was developed to comply  
7 with the Central Valley Flood Protection Act of 2008.

8 This new plan is focused on providing 200-year flood protection to urban areas in the two river  
9 basins, reducing flood risks to small communities and protecting agricultural lands from damage  
10 due to flooding. It also has goals, however, that mirror the goals of the BDCP, including:

- 11 • Promote natural dynamic hydrologic and geomorphic processes.
- 12 • Increase and improve the quantity, diversity, and connectivity of riparian, wetland, flood plain,  
13 and shaded riverine aquatic habitats, including the agricultural and ecological values of these  
14 lands.
- 15 • Promote the recovery and stability of native species populations and overall biotic community  
16 diversity.

17 The CVFPP includes provisions to include elements of the BDCP into the overall flood protection  
18 actions, once the BDCP is approved. This would include actions to modify the Yolo Bypass and  
19 Fremont and Sacramento Weirs.

### 20 **12.2.2.18 Yolo Bypass Wildlife Area Land Management Plan**

21 The Yolo Bypass Wildlife Area Land Management Plan (LMP) was finalized in June 2008 (California  
22 Department of Fish and Game 2008b). The LMP is a general policy guide to CDFW management of  
23 the wildlife area and is intended to contribute to habitat management that uses natural processes to  
24 create a sustainable system over the long term. The policies are based on an ecosystem approach to  
25 habitat management consistent with the principles of the Ecosystem Restoration Program included  
26 in the CALFED Bay-Delta Program as implemented by the California Bay-Delta Authority and CDFW.  
27 The terrestrial biological resources of the Yolo Bypass that are supported by the LMP have the  
28 potential to be affected by implementing CM2 in the BDCP.

## 29 **12.2.3 Regional and Local Plans, Policies, and Regulations**

### 30 **12.2.3.1 City and County General Plans**

31 This section provides a general discussion of goals, objectives, and policies related to terrestrial  
32 biological resources in the adopted general plans for each county or incorporated city in the Delta.  
33 As discussed in Chapter 13, *Land Use*, state and federal agencies and some local or regional agencies  
34 involved with the location or construction of facilities for the production, generation, storage,  
35 treatment, or transmission of water, generally are not subject to local land use regulations.

## 1 **Alameda County**

### 2 **East County Area Plan**

3 Land use planning in the eastern portion of Alameda County is governed by the East County Area  
4 Plan (ECAP), which was adopted by the county in May 1994. In November 2000, the Alameda  
5 County electorate approved Measure D, the Save Agriculture and Open Space Lands Initiative, which  
6 amended portions of the county's general plan, including the ECAP (Alameda County 2000).

7 The Open Space Element of the ECAP addresses sensitive lands and regionally significant open  
8 space, including biological resources. In addition, the East Alameda County Conservation Strategy  
9 (EACCS) was developed in 2010 as a planning document that identifies regionally-coordinated  
10 mitigation strategies aimed at conserving endangered or threatened species, under the ESA, certain  
11 nonlisted species, and habitat in order to offset specific anticipated development, transportation,  
12 and infrastructure projects (East Alameda County Conservation Strategy Steering Committee 2010).  
13 The EACCS does not allow local agencies to approve permits for projects that could adversely impact  
14 threatened and endangered species. Instead, it provides guidance during the project planning and  
15 permitting process to ensure that impacts are offset in a biologically effective manner.

## 16 **Contra Costa County**

### 17 **Contra Costa County General Plan**

18 The Contra Costa County General Plan was adopted in January 1991 and was amended in 1996 and  
19 2005 to reflect changes to the Land Use Map and the incorporation of the City of Oakley (Roche pers.  
20 comm. 2009). Three goals in the general plan's Conservation Element provide broad guidance for  
21 preservation of plant and animal habitat in the county. The element includes policies that are  
22 intended to protect natural habitat, ecological resources, and riparian zones in the county (Contra  
23 Costa County 2005).

### 24 **City of Oakley General Plan**

25 The City of Oakley General Plan was adopted in December 2002. The plan's Open Space and  
26 Conservation Element addresses protection and enhancement of environmental resources,  
27 including biological resources in the Delta. The Open Space and Conservation Element includes one  
28 goal and two policies relevant to the preservation and enhancement of terrestrial biological  
29 resources (City of Oakley 2002).

## 30 **Sacramento County**

### 31 **Sacramento County General Plan**

32 The Sacramento County General Plan was adopted on November 9, 2011. The general plan Open  
33 Space Element addresses preservation of natural resources over an extensive area that includes  
34 terrestrial and aquatic habitats and agricultural areas. The Open Space Element contains policies  
35 regarding protection of wetlands preserves, riparian corridors, woodlands, and floodplains. The  
36 element also calls for preparation of a comprehensive open space preservation strategy. The  
37 Conservation Element contains policies relating to habitat protection, management and restoration,  
38 vernal pools and other wetlands, channel modifications, maintenance of river and stream functions,  
39 native and landmark tree protections, and special-status species (Sacramento County 2011).

1       **City of Sacramento General Plan**

2       The City of Sacramento 2030 General Plan was adopted on March 3, 2009. The Environmental  
3       Resources Element of the General Plan addresses protection of biological resources, including  
4       wildlife habitat, open space corridors, and ecosystems. Eight policies from the Environmental  
5       Resources Element are applicable to the BDCP (City of Sacramento 2009).

6       **San Joaquin County**

7       **San Joaquin County General Plan**

8       San Joaquin County General Plan 2010 was adopted in 1992. The plan's Resources Element  
9       addresses protection of biological resources, including wetlands; riparian areas; rare, threatened,  
10      and endangered species and their habitats; potentially rare or commercially important species;  
11      vernal pools; significant oak groves; and heritage trees. Five policies from the Resources Element  
12      are considered applicable to the BDCP (San Joaquin County 1992). The general plan is currently  
13      undergoing revision.

14      **Solano County**

15      **Solano County General Plan**

16      The Solano County General Plan was adopted in August 2008 and approved by the voters in  
17      November 2008. The plan's Resources Element addresses conservation of biological resources  
18      throughout the county and specifically within the Delta. Six Resource Element policies concerning  
19      natural habitats and biological resources, and, more specifically, concerning the presence of special-  
20      status species, wetlands, special-status natural communities, and habitat connections, are  
21      considered applicable to the BDCP (Solano County 2008a).

22      General plan policies and other polices, programs, and regulations to preserve and enhance the  
23      wildlife habitat of Suisun Marsh and to ensure retention of upland areas adjacent to the marsh in  
24      uses compatible with its protection have been developed as part of Solano County's component of  
25      the Suisun Marsh Local Protection Program. These policies are included as Appendix C of the Solano  
26      County General Plan and were certified by BCDC on November 3, 1982, and amended on February 2,  
27      1999 (Solano County 2008b).

28      **City of Rio Vista General Plan**

29      The City of Rio Vista General Plan was adopted in July 2002. The plan's Resource Conservation and  
30      Management Element addresses conservation of resources, including biological resources. Two  
31      policies from this element concerning wetlands and native riparian habitat protection are  
32      considered applicable to the BDCP (City of Rio Vista 2002).

33      **Yolo County**

34      **Yolo County General Plan**

35      The Yolo County General Plan was adopted on November 10, 2009. The plan integrates, by  
36      reference, locally effective parts of the DSC's Land Use and Resource Management Plan for the  
37      Primary Zone of the Delta. Numerous goals, policies and actions related to the Delta are spread  
38      throughout General Plan elements. Conservation and Open Space Element policies concerning



1 special-status communities, heritage valley oak trees, roadside tree rows, special-status species,  
 2 riparian corridors, native habitat restoration and conservation, and floodplain management are  
 3 considered applicable to the BDCP (Yolo County 2009). In addition, a policy in the Conservation and  
 4 Open Space Element calls for ensuring that changes to operation of the Yolo Bypass and Fremont  
 5 Weir do not damage Yolo County agricultural, development and infrastructure interests. Another  
 6 Conservation and Open Space Element policy addresses compatibility of the BDCP with the  
 7 Clarksburg Agricultural District (Yolo County 2009).

### 8 **12.2.3.2 Habitat Conservation Plans**

9 The relationship between the BDCP and other conservation plans that include portions of the study  
 10 area is discussed in detail in Section 12.3.3.18, *Effects on Other Conservation Plans*, at the end of this  
 11 chapter. The plans that are discussed include the East Alameda Conservation Strategy, the East  
 12 Contra Costa County HCP/NCCP, the San Joaquin County Multi-species Habitat Conservation and  
 13 Open Space Plan, the South Sacramento HCP, the Solano County Multi-species Habitat Conservation  
 14 Plan and the Yolo Natural Heritage Program.

## 15 **12.3 Environmental Consequences**

16 This section describes potential direct (temporary, periodic and permanent), indirect, and  
 17 cumulative effects on terrestrial biological resources that would result with implementation of each  
 18 alternative. The impact analysis considers each of the alternatives' proposed features in four  
 19 principal areas: construction of the water conveyance facilities' structural components, which are  
 20 project-level features; operations and maintenance of these components, which are project-level  
 21 components; implementation of water management operational scenarios and other covered  
 22 activities described in Chapter 3, *Description of Alternatives*, which are project-level features; and  
 23 other conservation components, which are programmatic features. The organization of this section  
 24 provides for a separate analysis of each of the 16 alternatives being considered, including the No  
 25 Action Alternative. Five of the project alternatives (1A, 1B, 1C, 4, and 9) represent the major water  
 26 conveyance facility options analyzed in this chapter. From a terrestrial biological resources  
 27 perspective, the differences in effect between these alternatives are related to the construction of  
 28 the water conveyance facilities (CM1). All other conservation actions (CM2–22) are the same, except  
 29 under Alternatives 5 and 7. The impacts of Alternatives 1A, 1B, 1C, 4, and 9 are discussed in detail in  
 30 this chapter. The other action alternatives (2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, and 8) have very similar or  
 31 identical project features and impacts on terrestrial biological resources as the major conveyance  
 32 facility alternatives listed above. All of the alternatives are compared with Existing Conditions and  
 33 No Action Alternative baselines. To avoid repeating identical analyses for these alternatives (2A, 2B,  
 34 2C, 3, 5, 6A, 6B, 6C, 7 and 8), their effects are compared, as appropriate, with Alternatives 1A–1C to  
 35 highlight differences among the alternatives. Differences are presented in summary tables and text  
 36 format and the reader is referred to the similar major conveyance facility alternative for the  
 37 comparable detailed analysis.

38 Within each alternative, the analysis focuses on the resources of concern: natural communities,  
 39 covered animal and plant species, and noncovered animal and plant species. Because this document  
 40 is designed to satisfy both NEPA and CEQA requirements, each impact analysis presents a NEPA and  
 41 a CEQA conclusion. The NEPA conclusion has been reached by comparing the effect of the proposed  
 42 alternative with the effects of the No Action Alternative (the NEPA point of comparison). The CEQA

1 conclusion has been reached by comparing the effect of the proposed alternative to Existing  
 2 Conditions (the CEQA baseline). The cumulative analysis for all resources and all alternatives and  
 3 the potential for conflicts with other HCPs are included in separate sections at the end of the  
 4 chapter.

5 Terrestrial biological resources associated with the streams and reservoirs upstream of the study  
 6 area and within the SWP/CVP Export Service Areas are not discussed in detail in this section. The  
 7 potential for growth-related effects on terrestrial biological resources in the SWP/CVP Export  
 8 Service Areas is discussed in Chapter 30, *Growth Inducement and Other Indirect Effects*. The potential  
 9 for BDCP-related changes in average reservoir and river stages upstream of the Delta to affect  
 10 wetland and riparian habitats in reservoir inundation zones and along streambanks was considered  
 11 and is discussed in brief for potentially affected natural communities in the study area. CALSIM II  
 12 model predictions for reservoir volume and discharges for different water-year types and  
 13 appropriate rating curves (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*)  
 14 were used to predict average water surface elevations (stage) by water-year types. Based on a  
 15 review of these predictions, it was determined that the changes that could occur upstream of the  
 16 study area would be within the range of variation in water levels and flows that historically occur in  
 17 these water bodies. The terrestrial wildlife and vegetation that is supported by these water bodies  
 18 exist within this variation; changes in the pattern of high and low water levels in certain water-year  
 19 types and certain months would be expected as a result of implementing the BDCP. Where these  
 20 operational changes might affect the distribution of natural communities, these changes are  
 21 discussed in the operation and maintenance impact analyses. Where natural community changes  
 22 might affect special-status species, these effects are described in the operations and maintenance  
 23 analyses for those species.

### 24 **12.3.1 Determination of Effects**

25 The impacts of the action alternatives on terrestrial biological resources may result from  
 26 construction, operation and maintenance of BDCP water conveyance facilities, and from  
 27 construction and implementation of other conservation measures. This impact analysis assumes  
 28 that an action alternative would have an effect on terrestrial biological resources if it would directly  
 29 or indirectly harm or harass individuals or populations of the species considered in this chapter,  
 30 remove or damage the habitat of these species, or create barriers to the movement of these species.

#### 31 **12.3.1.1 Development of Significance Criteria**

32 The CEQA Guidelines (Title 14, Division 6, Chapter 3 of the CCR), at Section 15064.7, encourage  
 33 public agencies to develop thresholds of significance to use in determining the significance of  
 34 environmental effects when complying with CEQA. In this same section, the CEQA Guidelines define  
 35 a threshold of significance as “an identifiable quantitative, qualitative or performance level of a  
 36 particular environmental effect, non-compliance with which means the effect will normally be  
 37 determined to be significant by the agency and compliance with which means the effect normally  
 38 will be determined to be less than significant.” Although Section 15064.7 authorizes a public agency  
 39 subject to CEQA to conduct a formal public process for formulating significance thresholds that  
 40 would apply to all of the agency’s projects, the courts have recognized that, in preparing an  
 41 individual CEQA document, a lead agency may informally develop significance criteria applicable to  
 42 particular projects, provided that such criteria are supported by substantial evidence. (See, e.g.,  
 43 *Oakland Heritage Alliance v. City of Oakland* (2011) 195 Cal.App.4th 884, 896–897; *Citizens for*

1 *Responsible Equitable Environmental Development v. City of Chula Vista* (2011) 197 Cal.App.4th 327,  
2 336.)

3 Here the significance criteria used to evaluate impacts on biological resources are based on and  
4 incorporate guidance contained in Section 1508.27 of the Council on Environmental Quality (CEQ)  
5 NEPA regulations regarding significance determinations; the mandatory findings of significance, as  
6 listed in Section 15065 of the State CEQA Guidelines (Title 14, Chapter 3 of the CCR); and criteria  
7 contained in Appendix G, “Environmental Checklist Form,” of the CEQA Guidelines.

8 The CEQ NEPA regulations found in Title 40, CFR focus federal agencies’ attention on impacts on  
9 endangered and threatened species. Section 1508.27 of those regulations defines the word  
10 *significantly*, which comes into play in the statutory mandate under NEPA for federal agencies to  
11 prepare Environmental Impact Statements for major federal actions *significantly* affecting the  
12 human environment (42 USC Section 4321). Under Section 1508.27, federal agencies, in determining  
13 whether a major federal action significantly affects the human environment, should consider both  
14 the *context* and the *intensity* of the effects at issue. Context relates to the setting for the proposed  
15 action (i.e., whether it is regional or local in scale). Intensity “refers to the severity of impact.”  
16 Among the factors to be considered in assessing intensity are “[t]he degree to which the action may  
17 adversely affect an endangered or threatened species or its habitat that has been determined to be  
18 critical under the Endangered Species Act of 1973.”

19 In enacting CEQA, the legislature found and declared that it was the policy of the state, among other  
20 things, to “[p]revent the elimination of fish or wildlife species due to man’s activities” and “insure  
21 that fish and wildlife populations do not drop below self-perpetuating levels” (Public Resources  
22 Code Section 21001[c]). Under CEQA Guidelines Section 15065, which echoes this policy statement,  
23 impacts are significant under CEQA if a proposed project would result in any of the conditions listed  
24 below.

- 25 ● Substantially reduce the habitat of a fish or wildlife species.
- 26 ● Cause a fish or wildlife population to drop below self-sustaining levels.
- 27 ● Threaten to eliminate a plant or animal community.
- 28 ● Substantially reduce the number or restrict the range of an endangered, rare or threatened  
29 species.

30 These impact categories, originally formulated in the 1970s, are broadly framed and leave room for  
31 expert judgment and application. The sample Initial Study Checklist found in Appendix G to the  
32 CEQA Guidelines identifies questions lead agencies should generally ask with respect to a proposed  
33 project’s potential impacts on biological resources. These questions are often used to give rise to  
34 significance thresholds where a proposed project would do any of the following.

- 35 ● Have a substantial adverse effect, either directly or through habitat modifications, on any  
36 species identified as a candidate, sensitive, or special status species in local or regional plans,  
37 policies, or regulations, or by USFWS or CDFW.
- 38 ● Have a substantial adverse effect on any riparian habitat or other sensitive natural community  
39 identified in local or regional plans, policies, regulations, or by USFWS or CDFW.
- 40 ● Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of  
41 the CWA (including marsh, vernal pool, coastal) through direct removal, filling, hydrological  
42 interruption, or other means.

- 1 • Interfere substantially with the movement of any native resident or migratory fish or wildlife  
2 species or with established native resident or migratory wildlife corridors, or impede the use of  
3 native wildlife nursery sites.
- 4 • Conflict with any local policies or ordinances protecting biological resources, such as a tree  
5 preservation policy or ordinance.
- 6 • Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community  
7 Conservation Plan, or other approved local, regional, or state habitat conservation plan.

### 8 **12.3.1.2 Significance Criteria for Terrestrial Biological Resources**

9 For this analysis, all of the general criteria described above have been tailored to deal with  
10 terrestrial species and applied to all determinations of effect for each impact mechanism discussed  
11 in the following pages. All aspects of the alternatives are subject to these criteria, including the  
12 construction, operation and maintenance of BDCP water conveyance facilities, and the  
13 implementation of other conservation measures. Based on the foregoing general criteria, an  
14 alternative would have an adverse effect under NEPA and a significant adverse impact under CEQA  
15 on terrestrial biological resources if it meets any of the criteria listed below.

- 16 • Have a substantial adverse effect, either through direct mortality or through habitat  
17 modifications, including designated critical habitat, on any terrestrial plant or wildlife species  
18 identified as a candidate, sensitive, or special-status species in local or regional plans, policies,  
19 or regulations, or by CDFW or USFWS, including substantially reducing the number or  
20 restricting the range of an endangered, rare, or threatened species. For purposes of this analysis,  
21 an effect would be substantial if it would result in:
  - 22 ○ The adverse modification of critical habitat designated by the USFWS;
  - 23 ○ A permanent reduction in the acreage and value of modeled habitats for special-status  
24 species (as defined in the BDCP);
  - 25 ○ A permanent reduction in the acreage and value of habitat for noncovered wildlife species  
26 within the study area;
  - 27 ○ A permanent reduction in the acreage and value of known occupied habitat for noncovered  
28 plant species (based on specific occurrence records) within the study area;
  - 29 ○ A reduction in the availability of mature trees that provide suitable nesting or roosting  
30 habitat for special-status birds;
- 31 • Have a substantial adverse effect on any sensitive natural community identified in local, state, or  
32 federal regional plans, policies, or regulations, including long-term degradation of a sensitive  
33 plant community because of substantial alteration of a landform or site conditions. For purposes  
34 of this analysis, an effect would be substantial if it would result in a permanent reduction in the  
35 acreage and value of the sensitive natural community within the study area.
- 36 • Have a substantial adverse effect on federally or state protected wetlands, including marsh,  
37 vernal pool, and coastal wetlands, through direct removal. For purposes of this analysis, an  
38 effect would be substantial if it would result in a permanent reduction in the acreage of a  
39 wetland regulated under Section 404 of the Clean Water Act or the Porter-Cologne Water  
40 Quality Control Act.

- 1       • Substantially reduce the habitat of a common terrestrial plant or wildlife species. For purposes  
2       of this analysis, an effect would be considered substantial if it would cause a common terrestrial  
3       plant or wildlife population to drop below self-sustaining levels, or threaten to eliminate a  
4       common terrestrial plant or animal community within the study area.
- 5       • Interfere substantially with the movement of any native resident or migratory wildlife species  
6       or with established native resident or migratory wildlife corridors, or impede the use of native  
7       wildlife nursery sites.
- 8       • Conflict substantially with goals set forth in an approved recovery plan for a federally listed  
9       terrestrial plant or wildlife species, or with goals set forth in an approved State Recovery  
10      Strategy (Fish and Game Code Section 2112) for a state-listed terrestrial plant or wildlife  
11      species. For purposes of this analysis, a conflict would be considered substantial if it would  
12      eliminate the possibility of achieving any goal included in a recovery plan.
- 13      • Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community  
14      Conservation Plan, or other approved local, regional, or state habitat conservation plan. For  
15      purposes of this analysis, a conflict would exist if the BDCP:
  - 16      ○ Eliminated existing or planned conservation sites identified in an HCP/NCCP.
  - 17      ○ Required protection, conversion or restoration of cropland or natural communities to the  
18      extent that an existing HCP/NCCP could not achieve its conservation goals.
  - 19      ○ Required protection, conversion or restoration of cropland or natural communities to the  
20      extent that the Central Valley Joint Venture 2006 Implementation Plan could not achieve its  
21      conservation goals.
- 22      • Result in effects on terrestrial biological resources that are individually limited but cumulatively  
23      considerable.

24      In the impact discussions that start in Section 12.3.3, the NEPA significance determination follows  
25      the main body of the impact analysis. The CEQA significance determination is included in an  
26      independent concluding section.

## 27    **12.3.2      Methods for Analysis**

28      This section describes the methods used to assess the effects of implementing the BDCP on  
29      terrestrial biological resources.

30      For preparation of the EIR/EIS, the information used to conduct the environmental consequences  
31      analysis came primarily from the sources listed below.

- 32      • BDCP GIS natural community database.
- 33      • BDCP and Appendices.
- 34      • Field surveys conducted during 2009 to 2011 (*Appendix 12C, 2009 to 2011 Bay Delta*  
35      *Conservation Plan EIR/EIS Environmental Data Report*).
- 36      • Natural community and wildlife habitat mapping for areas outside of the Plan Area (see Section  
37      12.1.2.1).

- 1       • Results of hydrodynamic and salinity modeling (See Chapter 4, *Approach to Environmental*  
2       *Analysis*; Chapter 6, *Surface Water*; Chapter 7, *Groundwater*; and Chapter 8, *Water Quality*, for  
3       more information on the methodology for these assessments).
- 4       • Results of hydraulic modeling conducted by ESA PWA to determine the extent of tidal marsh  
5       expansion in marsh restoration areas (BDCP Appendix 5E, *Habitat Restoration*<sup>8</sup>).
- 6       • *BDCP Waterfowl Effects Analysis* (Ducks Unlimited 2013)
- 7       • Draft *Bay Delta Conservation Plan Supplemental Shorebird Effects Analysis* (ICF International  
8       2013).
- 9       • GIS data layers of water conveyance facilities developed by DWR and other conservation  
10      measure footprints developed by BDCP staff.
- 11      • DWR mapping of jurisdictional wetlands and waters of the United States within the water  
12      conveyance facilities corridors (California Department of Water Resources 2013a, 2013b).

### 13   **12.3.2.1    Analysis Approach**

14       The methods used to address permanent, temporary, periodic, and indirect effects in this chapter  
15       are similar to those used in the BDCP effects analysis (BDCP Appendix 5.J, *Effects on Natural*  
16       *Communities, Wildlife, and Plants*) that were developed for natural communities and BDCP-covered  
17       species (Table 12-2 lists covered species). Effects on special-status species that are not covered in  
18       the BDCP (referred to as noncovered species; listed in Table 12-3) were evaluated using generally  
19       the same methods and assumptions outlined in BDCP Appendix 5.J, *Effects on Natural Communities,*  
20       *Wildlife, and Plants*, and assessed based on the species habitats (as they are defined in Sections  
21       12.1.3.2 and 12.1.3.3) and occurrences. In addition, other biological resources issues were  
22       considered, including effects on state and federally protected wetlands and waters, common plant  
23       and wildlife species, wildlife movement corridors, waterfowl and shorebirds, potential for  
24       introducing or spreading invasive plants and consistency with other plans and policies.

25       Development of the BDCP effects analysis involved literature review, development of species-  
26       specific habitat models for covered species, review of known occurrences of special-status species  
27       based on CNDDDB and CNPS Inventory records, review of information obtained from species experts,  
28       limited field surveys by DWR, and GIS analyses. The BDCP includes an extensive, detailed  
29       methodology documenting the specifics of the approach and assumptions for assessing the effects of  
30       implementing the BDCP (BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*).  
31       Most of these methods were also used for the EIR/EIS analysis of the environmental consequences  
32       for terrestrial biological resources. The EIR/EIS team evaluated the affected acreages for covered  
33       species and natural communities and confirmed that the determination of effects appropriately  
34       considered the specific species assumptions included in the species accounts and defined methods  
35       of the BDCP. However, it should be recognized that the BDCP analysis addresses the effects of  
36       implementing the BDCP on the covered species list (focusing on requirements of ESA, CESA, and  
37       NCCPA). The EIR/EIS assesses a broader range of environmental consequences associated with ESA,  
38       CESA, and NCCPA, as well as CEQA, NEPA, CWA, MBTA, and other applicable regulations addressing  
39       biological resources. The EIR/EIS does not use the *net effects* assessment method included in the  
40       BDCP to identify the benefits to species of implementing the Plan. The determination of benefits to

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<sup>8</sup> As described in Chapter 1, *Introduction*, Section 1.1, the full Draft EIR/EIS should be understood to include not only the EIR/EIS itself and its appendices but also the proposed BDCP documentation including all appendices.

1 species and the need for mitigation in the EIR/EIS is outlined below in Section 12.3.2.5, *Methods*  
 2 *Used to Consider Mitigation*. The determination of benefits relies on the acreage commitments  
 3 defined in the BDCP.

#### 4 **Direct and Indirect Effects**

5 This impact analysis contains an assessment of both the direct and reasonably foreseeable indirect  
 6 effects of the BDCP alternatives. This analysis establishes the maximum potential for impacts of  
 7 BDCP actions and may not reflect the final impact because restoration and protection actions have  
 8 been analyzed programmatically. Direct effects of constructing water conveyance facilities for  
 9 individual alternatives as well as implementing BDCP conservation measures consist of habitat  
 10 removal and construction or inundation-related disturbances, mortality of wildlife or plants,  
 11 immediate displacement of wildlife, immediate degradation of habitats, and direct removal of  
 12 natural communities.

13 Indirect effects consist of project-related effects that would occur later in time or farther removed in  
 14 distance than the direct effects. These potential effects consist of alterations to species habitats that  
 15 are adjacent to directly affected areas (e.g., changes in hydrology in adjacent areas), disturbances to  
 16 nearby wildlife during construction (e.g., disruption of breeding and foraging behaviors from noise,  
 17 light and glare), and other effects occurring later in time (e.g., collisions of birds with transmission  
 18 lines built to meet BDCP requirements and fragmentation of habitat). Indirect effects can result both  
 19 from construction and from operations and maintenance (e.g., ground disturbance could result in  
 20 the spread and establishment of invasive plants).

21 Indirect effects for both covered and noncovered species were assessed qualitatively, except for  
 22 effects on vernal pool crustaceans and greater sandhill crane, which were assessed quantitatively.  
 23 Other sources that supported analysis of indirect effects included the greater sandhill crane noise  
 24 analysis (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
 25 *Conveyance Facility on Sandhill Crane*), EIR/EIS Chapter 23, *Noise*, and Table 5.J-4 and 5.J-5 in BDCP  
 26 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*.

27 The direct effects of constructing the water conveyance facilities would be the result of, but would  
 28 not be limited to, the types of actions listed below.

- 29 ● Clearing and grubbing for physical water conveyance components (e.g., intake facilities and  
 30 infrastructure, levees), staging areas, storage/stockpile areas, construction crew parking, and  
 31 construction access roads.
- 32 ● Excavating for physical water conveyance components (e.g., borrow pits, pipelines, forebays,  
 33 sedimentation basins, canals, tunnel access shafts).
- 34 ● Dredging waterways.
- 35 ● Importing, distributing, storing, or disposing of fill, borrow, spoil, or dredge material.
- 36 ● On-road and off-road traffic from construction vehicles (e.g., water and cement trucks), personal  
 37 vehicles of construction staff, and transport of construction equipment within the study area  
 38 and to/from the study area.

39 The direct and indirect effects of operating and maintaining the water conveyance facilities would  
 40 result from a wide range of activities over the life of the BDCP. The proposed intake facilities  
 41 (including intake pumping plants, sedimentation basins and solids lagoons) would require

1 scheduled routine or periodic adjustment and tuning to remain consistent with design intentions.  
 2 Emergency maintenance is also anticipated. Routine facility maintenance would consist of activities  
 3 such as painting, cleaning, repairs, and other tasks to operate facilities in accordance with design  
 4 standards after construction and commissioning. Maintenance activities associated with river  
 5 intakes could include removal of sediments, debris, and biofouling materials. These maintenance  
 6 actions could require suction dredging or mechanical excavation around intake structures;  
 7 dewatering; or use of underwater diving crews, boom trucks or rubber wheel cranes, and raft- or  
 8 barge-mounted equipment. Sediment in solids lagoons and channels would also be removed  
 9 periodically.

10 Maintenance requirements for the canal segments of alternatives would include erosion control,  
 11 control of vegetation and rodents, embankment repairs in the event of flooding and wind wave  
 12 action, and monitoring of seepage flows. The sediment traps constructed in channels and canals  
 13 would be periodically dredged to remove the trapped sediment.

14 Direct and indirect effects from implementation of habitat restoration and enhancement  
 15 conservation measures would be anticipated to result from the types of actions listed below.

- 16 • Grading, excavation, and placement of fill material.
- 17 • Breaching, modification, or removal of existing levees and construction of new levees.
- 18 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,  
 19 electric transmission and gas lines, irrigation infrastructure).
- 20 • Construction of new infrastructure (e.g., buildings, roads, fences, electric transmission and gas  
 21 lines, irrigation infrastructure).
- 22 • Removal of existing vegetation and planting/seeding of vegetation.
- 23 • Controlling the establishment of nonnative vegetation to encourage the establishment of target  
 24 native plant species.
- 25 • Control of nonnative predator and competitor species (e.g., feral cats, rats, nonnative foxes).

26 Habitat management actions include all activities undertaken to maintain the intended functions of  
 27 protected, restored, and enhanced habitats over the term of the BDCP. Habitat management actions  
 28 that could create direct and indirect effects on terrestrial biological resources are anticipated to  
 29 include the activities listed below.

- 30 • Minor grading, excavation, and filling to maintain infrastructure and habitat functions (e.g., levee  
 31 maintenance; grading or placement of fill to eliminate fish stranding locations).
- 32 • Maintenance of infrastructure (e.g., buildings, roads, fences, electric transmission and gas lines,  
 33 irrigation infrastructure, fences).
- 34 • Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 35 • Ongoing control of terrestrial and aquatic nonnative plant and wildlife species.

## 36 **Effects Duration**

37 Some effects described in this chapter have been categorized based on their duration. BDCP effects  
 38 on terrestrial biological resources could be permanent, temporary, or periodic, as defined below.



1 Effects have been categorized as *permanent* where a biological resource would be removed or lost  
2 and would not be replaced at its original site. Permanent effects would occur primarily at  
3 construction sites. Construction of aboveground water conveyance structures and ancillary facilities,  
4 and similar structures or facilities associated with other conservation measures would permanently  
5 remove or alter habitats and could result in the loss of individual special-status plants or animals.  
6 Development and use of reusable tunnel material (RTM) storage sites have been characterized as  
7 permanent losses of biological resources because of the uncertainty of replacing the resource and  
8 the length of time between the loss of the resource and the first opportunity to restore or replace the  
9 resource after dewatering and chemical characterization of the RTM (as much as 5 to 10 years).  
10 Activities associated with tunneling and RTM placement are likely to occur across multiple years at  
11 RTM storage areas.

12 Even though RTM-related resource damage is being considered permanent for purposes of the  
13 impact analysis, there is an environmental commitment to reuse the material or dispose of it at  
14 appropriate facilities, as described in Appendix 3B, *Environmental Commitments*. It is anticipated  
15 that much of the material would be removed from storage areas and applied, as appropriate, as  
16 bulking material for levee maintenance or as fill material for habitat restoration projects, or would  
17 be put to other beneficial reuses. Following removal of material, stockpiled topsoil at RTM storage  
18 areas would be reapplied, and disturbed areas would be returned as near as feasible to  
19 preconstruction conditions.

20 Effects have been categorized as *temporary* where construction-related habitat losses would be  
21 restored to the affected area's predisturbance condition within one year of completing construction.  
22 The types of areas that would be expected to be restored include borrow and spoil disposal sites,  
23 barge facility work areas, bridge/control work areas, bridge work areas, canal work areas, intake  
24 work areas, pumping plant work areas, channel enlargement work areas, control structure work  
25 areas, dredging work areas, operable barrier work areas, pipeline work areas, railroad work areas,  
26 temporary access road work areas, safe haven work areas, and siphon work areas. Because water  
27 conveyance construction would take place over a 10-year period with varying periods of activity at  
28 individual construction sites, there is uncertainty as to the length of time these temporarily affected  
29 areas would be disturbed prior to restoration. Therefore, temporary effects on some terrestrial  
30 plants and wildlife are treated as a permanent loss of habitat for the purposes of determining the  
31 amount of conservation action necessary to offset these effects.

32 Effects have been categorized as *periodic* where they would result from cyclical or irregular  
33 activities associated with operation of the water conveyance facilities or other conservation  
34 measures associated with the BDCP. Periodic inundation effects on the biological resources of the  
35 Yolo Bypass would result from modifications to the Fremont Weir and controlled flooding of the  
36 bypass, which would cause inundation at a frequency, duration, and magnitude that exceeds the  
37 current inundation regime (a result of implementing CM2). Periodic dredging of Middle River and  
38 Victoria Canal under Alternative 9 (Through Delta/Separate Corridors) would cause sedimentation  
39 and turbidity in adjacent wetlands and riparian habitat. Periodic inundation resulting from seasonal  
40 floodplain restoration (CM5) would affect natural communities and special-status species occupying  
41 the newly created floodplains.

## 42 **Effects Time Periods**

43 Effects of the BDCP were also evaluated for two timeframes for all natural communities and special-  
44 status species: the near-term, which extends from years 1–10 of BDCP implementation; and the late

1 long-term, which covers the entire 50-year term of the BDCP, after which the ESA and NCCPA  
 2 permits expire (years 1–50). Water conveyance facilities would be constructed during the near-  
 3 term, along with initial implementation of habitat restoration, enhancement, and protection, and  
 4 other conservation components. The habitat restoration, enhancement, and protection, and the  
 5 activities associated with the other conservation components would be initiated at the outset of Plan  
 6 implementation and would continue to be implemented throughout the lifetime of the permits.  
 7 Table 3-4 in Chapter 3, *Description of Alternatives*, provides a summary of the BDCP’s restoration  
 8 and protection commitments for each time period.

### 9 **12.3.2.2 Methods Used to Assess Natural Community Effects**

10 The natural community effects analysis includes a discussion of individual conservation measures  
 11 and the combined effects of implementing all of the BDCP conservation measures: habitat  
 12 restoration actions, other conservation measures, and construction and operation of the water  
 13 conveyance facilities. The direct and indirect effects of these actions and operation and maintenance  
 14 of all BDCP facilities have been included. In addition, effects on habitat value have been considered  
 15 and addressed where relevant, including effects of habitat fragmentation, connectivity, patch size  
 16 and degradation of habitat functions. These effects have been assessed qualitatively based on  
 17 changes in the distribution and extent of each natural community removed or gained relative to  
 18 existing distributions. This assessment has been conducted by reviewing water conveyance facilities  
 19 and hypothetical restoration and enhancement area footprints over aerial imagery to determine  
 20 whether these activities would fragment existing natural communities or disrupt potentially  
 21 important wildlife migration corridors. Migration corridor and habitat fragmentation and  
 22 connectivity as they relate to natural community distribution have also been considered  
 23 qualitatively by reviewing landscape linkages (within the Plan Area and on a regional scale)  
 24 identified by CDFW and reported in the BDCP (Chapter 3, Table 3.2-3, and Figure 3.2-16), and by  
 25 considering how BDCP physical facilities might impede terrestrial species movement through  
 26 natural communities and conservation lands. Field survey information reported in Appendix 12C  
 27 and information collected in reconnaissance site visits by qualified biologists have also contributed  
 28 to qualitative assessments of habitat heterogeneity, presence of buffers, and species-specific habitat  
 29 requirements

30 The natural community effects assessment includes an assessment of effects on wetlands and other  
 31 sensitive habitats. Restoration and enhancement measures and construction of water conveyance  
 32 facilities would have temporary and permanent effects on wetlands. Natural communities that could  
 33 qualify as wetlands are tidal and nontidal perennial aquatic, tidal freshwater emergent wetland,  
 34 nontidal freshwater perennial emergent wetland, vernal pool complex, alkali seasonal wetland  
 35 complex, managed wetland, other natural seasonal wetland, and valley/foothill riparian.

### 36 **Water Conveyance Facilities**

37 The GIS layers depicting all water conveyance construction activities that could affect the natural  
 38 communities (e.g., grading, excavation, paving) have been overlain with the natural communities GIS  
 39 layer. Direct effects of constructing water conveyance facilities have been classified as permanent or  
 40 temporary based on the duration of the effect as described above under *Effects Duration*. Indirect  
 41 effects on natural communities from constructing the water conveyance facilities are not discussed  
 42 in detail in this chapter. CM22 contains a substantial list of avoidance and minimization measures  
 43 that would be implemented during water conveyance facilities construction to avoid and minimize  
 44 effects on adjacent wetlands and other vegetation types.

## 1       **Restoration, Enhancement, and Protection**

2       Habitat restoration, enhancement and protection actions are proposed for implementation over the  
3       50-year life of the Plan. Implementing CM2–CM11, which are focused on habitat restoration,  
4       enhancement, and protection, would result in physical changes to existing terrestrial biological  
5       resources. The BDCP conservation measures designed to address “other stressors” on aquatic  
6       species (CM12–CM21) were not considered to have effects on terrestrial biological resources, but  
7       are discussed briefly where applicable in Section 12.3, *Environmental Consequences*.

8       Detailed plans for restoration, enhancement, and preservation actions have not been prepared for  
9       multiple reasons: (1) because the habitat restoration and enhancement would be implemented, if  
10      feasible, in areas with willing sellers, none of whom has been identified; (2) to maintain flexibility in  
11      the BDCP for adaptive management; and (3) because BDCP implementation has a long timeframe.  
12      However, although specific locations proposed for habitat restoration and enhancement have not  
13      been defined at this time, the EIR/EIS must quantify the environmental effects to the degree of  
14      specificity available for the project description. Therefore, the assessment of the effects for the  
15      habitat restoration and enhancement was programmatic. The analysis has focused on the  
16      geographic areas identified in the BDCP as most likely to support restoration, enhancement and  
17      protection. These geographic areas have been characterized as conservation zones that encompass  
18      the entire Plan Area (see Figures 3-1 and 12-1), and, for tidal natural communities restoration, as  
19      restoration opportunity areas that focus on smaller regions of the Plan Area (see Figure 12-1). These  
20      geographic divisions are described in Section 12.1 of this chapter.

21      For this programmatic analysis, natural communities that might be modified for habitat restoration  
22      were quantified using a GIS layer that included preliminary footprints for some types of restoration.  
23      Preliminary footprints were established for *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal*  
24      *Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The  
25      acreages of natural community types that would be removed by restoration were calculated, as were  
26      the acreages of natural community types that would develop after restoration based on site  
27      attributes, such as soil types and topography. Additional NEPA and CEQA considerations may be  
28      necessary in the future when actual restoration projects are proposed outside of the preliminary  
29      footprints used to conduct the programmatic analysis in this EIR/EIS.

30      In addition to the direct loss of terrestrial communities associated with the conversion, indirect  
31      effects associated with a change in tidal action, and changes in salinity could occur. Potential  
32      changes to terrestrial communities associated with changes to tidal actions were evaluated using  
33      output from two-dimensional hydrodynamic RMA modeling.

### 34      **12.3.2.3       Methods Used to Assess Species Effects**

35      The analysis of effects on terrestrial plant and wildlife species in this chapter considers the direct  
36      and indirect effects of implementing BDCP conservation measures for restoration, enhancement,  
37      and preservation (CM2–CM11), and water conveyance facilities (CM1). The assessment evaluates  
38      permanent, temporary, and periodic effects on terrestrial species, including special-status species.

39      From 2009 through 2011, DHCCP and consulting biologists conducted field surveys for special-  
40      status species that have the potential to occur in the Plan Area. These surveys were limited to public  
41      lands and to private lands that were accessible for the surveys. The methods and a summary of the  
42      results for these surveys are provided in Appendix 12C, *2009–2011 Bay Delta Conservation Plan*  
43      *EIR/EIS Environmental Data Report*. All observed special-status species occurrences were entered

1 into a GIS database. The survey results were in some cases used to modify the BDCP species-habitat  
2 models. The survey results were primarily used to verify species-habitat relationships. These results  
3 were used together with occurrence data in the CNDDDB to determine whether construction  
4 footprints would affect these species occurrences; in some cases, project footprints were modified to  
5 avoid sensitive areas. Since the release of the DHCCP report (Appendix 12C), some of the DHCCP  
6 occurrence data has been incorporated into the CNDDDB. As noted above, the DHCCP surveys did not  
7 occur on all lands within the conveyance alignment footprints and the CNDDDB data is limited by  
8 where previous surveys have occurred; therefore, the actual effects to individuals or populations  
9 may be higher than is presented in the species effects discussions for the conveyance facilities  
10 (CM1).

## 11 **Covered Species**

12 For covered species, the BDCP team developed species-habitat models that are presented in BDCP  
13 Appendix 2.A, *Covered Species Accounts*. These GIS-based species-habitat models consist of a GIS  
14 layer of potentially suitable habitat for the species based on its habitat requirements, which were  
15 modeled using several GIS data sources depicting vegetation, soils, topography, land use, and other  
16 parameters. The methods used by the BDCP to determine effects on covered species are described in  
17 BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The analysis of the effects  
18 from conveyance facility construction and restoration actions were analyzed quantitatively where  
19 specific (conveyance facilities) or hypothetical (restoration) footprints were available. Effects from  
20 other conservation actions, such as enhancement, management, operations, and maintenance were  
21 analyzed qualitatively.

22 The species-habitat models were reviewed by the EIR/EIS lead agencies and CDFW. The models  
23 have limitations in their ability to estimate habitat area with precision. In some cases, they may  
24 overestimate the extent of habitat because they do not incorporate information such as microhabitat  
25 conditions and other site-specific variables (e.g., water depth, habitat structure). Conversely,  
26 because of minimum mapping unit limitations, some of the models identify areas as nonhabitat that  
27 do support species habitat. For example, habitat areas that are smaller than the minimum mapping  
28 unit size (1 acre) may not be identified. This may be important for species that can use small,  
29 isolated habitats, such as birds that nest in isolated individual trees or small groups of trees. Where  
30 applicable, wildlife species' habitat was also identified according to type (e.g., breeding, foraging, or  
31 dispersal habitat).

32 It is important to note that although the models portray a reasonable distribution of habitat for each  
33 covered species, they do not necessarily indicate with certainty that covered species are restricted  
34 to those areas. Instead, the models indicate that nonhabitat areas have a much lower probability of  
35 species occurrence compared with areas identified as habitat. In some cases the BDCP models were  
36 developed using site-specific species occurrence information from the CNDDDB and information from  
37 extensive field surveys conducted in and around water conveyance facility footprints by DWR  
38 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).  
39 BDCP species-habitat models were used to identify suitable habitat as a regionwide evaluation tool  
40 in this EIR/EIS.

41 Effects of constructing water conveyance facilities on covered species have been analyzed using the  
42 same species-habitat GIS models as were used for restoration measures. Facility footprints were  
43 overlain on species' habitat GIS layers, and the acreages of temporary and permanent effects were  
44 calculated. Depending on the species biology, indirect effects were assessed either quantitatively or

1 qualitatively, based on a description of the construction activities (see Chapter 3, *Description of the*  
2 *Alternatives*). To make the water conveyance facilities impact analysis more site-specific, species  
3 occurrence data were evaluated as a component of the value assessment for habitat. DHCCP and  
4 consulting biologists conducted extensive field surveys recently in and around the conveyance  
5 facilities footprint and alternative alignments for this facility. Therefore, occurrence data have been  
6 used to assess effects of the conveyance facilities construction (CM1) to a greater extent than they  
7 are used to assess effects of other conservation measures.

8 Effects of construction noise on greater sandhill crane habitat were estimated by calculating the  
9 distances from construction sites subject to noise above 60 dBA, and 50 dBA (BDCP Appendix 5J,  
10 Attachment D). Construction activities were classified into five construction activity types that each  
11 were assumed to have a typical noise level. Categories of noise sources at construction sites  
12 (measured at 50 feet distance) are listed below.

- 13 • Impact pile driving: 101 dBA.
- 14 • Multiple source construction activities: 96 dBA.
- 15 • Conveyor belt return/load/booster drive (Alternative 4 only): 85 dBA.
- 16 • Conveyor belt mid-segment (Alternative 4 only): 75 dBA.
- 17 • Heavy trucks: 85 dBA.

18 Pile driving was analyzed separately due to the unique characteristics of noise produced from this  
19 noise source (intermittent impact noise). Multiple source construction noise was characterized by  
20 calculating the noise levels that would be produced when the loudest six pieces of construction  
21 equipment were operating simultaneously, and noise from heavy trucks was calculated assuming  
22 three heavy trucks operating in the same general area simultaneously.

23 To assess the potential effect of noise on sandhill cranes the noise level expected was calculated for  
24 known roosting habitat (at temporary and permanent roosts), and in modeled foraging habitat.  
25 Calculations assumed direct line-of-sight (no intervening barriers) with an atmospheric noise  
26 attenuation rate of approximately 6 dBA with each doubling of distance plus an additional  
27 attenuation of 1.5 dBA noise absorption due to propagation over soft ground (e.g., agricultural land,  
28 open natural habitat). Therefore, total noise attenuation was calculated as 7.5 dBA per doubling of  
29 distance from the source. For construction noise, distance to noise level contours were calculated  
30 from the edge of each identified construction area, giving a conservative worst-case estimate of  
31 noise levels because most of the construction activity would not take place on the perimeter of each  
32 site.

33 Overlay of the noise contours on the modeled foraging and known temporary and permanent roost  
34 sites was used to calculate the areas affected by expected worst-case noise levels above 60 dBA and  
35 50 dBA. When the noise levels from different noise categories overlapped, the category with the  
36 highest noise level was assumed to be operating. More detail on the methods for determining the  
37 construction noise effects on greater sandhill crane habitat can be found in BDCP Appendix 5J,  
38 Attachment D.

39 Using global position system receivers, the DHCCP surveys also mapped locations of elderberry  
40 shrubs (which are used by valley elderberry longhorn beetle to complete its lifecycle) in the DHCCP  
41 Conveyance Planning Area, where accessible. The spatial data collected consisted of point and line  
42 data and was attributed with size class, habitat found in, an estimate of the number of stems, and in

1 some cases the estimate of the number of shrubs associated with a spatial feature (i.e., some lines  
 2 represented as many as 160 shrubs). To determine the number of elderberry shrubs potentially  
 3 impacted by CM1 for each alternative, ICF GIS staff intersected the conveyance alignment  
 4 alternatives with the elderberry shrub line and point data. Where an individual line represented  
 5 multiple shrubs along a channel, an estimate of the number of shrubs impacted by a particular  
 6 conveyance alignment was generated by multiplying the number of shrubs represented by the line  
 7 by the proportion of the line intersected by the conveyance alignment. For example, if a 1,000-foot-  
 8 long line representing 100 shrubs had 500 feet of its length intersected by one of the conveyance  
 9 alignment alternatives, then the 100 shrub total was multiplied by 0.50 (500/1,000) to come up  
 10 with an estimate of 50 shrubs impacted.

11 Changes in salinity, selenium and methylmercury and their potential effects on covered species have  
 12 been assessed qualitatively based on extrapolation of water quality modeling results. These  
 13 potential effects are based on salinity modeling results that were used to predict the extent of  
 14 available habitat for species that depend on brackish or freshwater tidal emergent wetland, as well  
 15 as modeling results for selenium and methylmercury (see Chapter 8, *Water Quality*, and BDCP  
 16 Appendix 5.D, *Contaminants*).

### 17 **Noncovered Species**

18 Effects on noncovered species were determined in GIS using the same construction and  
 19 hypothetical footprints overlain on habitat models developed by ICF staff for these species. As  
 20 described in Sections 12.1.3.2 and 12.1.3.3, modeled habitat for noncovered species in the study  
 21 area was defined by one or more of the following characteristics: species range; natural  
 22 communities in which the species are found; and occurrence records. In cases where covered and  
 23 noncovered species have the same habitat requirements (e.g., the covered least Bell's vireo and the  
 24 noncovered yellow warbler), modeled habitat for the covered species was applied to the noncovered  
 25 species. For a few species that have specific habitat elements that are at a smaller scale than the  
 26 minimum mapping units used in the BDCP vegetation/land cover dataset (e.g., sand bar habitat for  
 27 anthicid beetles) the extent of habitat and impacts from conservation measures were qualitatively  
 28 evaluated.

### 29 **Plant Species**

30 Detailed habitat models similar to those in the BDCP have not been created for noncovered special-  
 31 status plant species (Table 12-3). The impact analysis relies largely on species occurrences but also  
 32 considers impacts on the natural communities in which species occur and considers models for  
 33 covered species that have the same habitat requirements as noncovered species have. Species  
 34 occurrence information in the study area was obtained from the CNDDDB and surveys conducted for  
 35 the Delta Habitat Conservation and Conveyance Program (Appendix 12C, *2009 to 2011 Bay Delta  
 36 Conservation Plan EIR/EIS Environmental Data Report*). GIS data layers have been created for the  
 37 noncovered special-status plant species, with separate layers based on whether the occurrences are  
 38 geographically specific or nonspecific. Impacts have been determined by overlaying the footprint of  
 39 conservation measures on the mapped occurrences. All occurrences partly or completely  
 40 overlapped by the footprint have been considered to be affected. All impacts resulting from ground  
 41 disturbance have been assumed to be permanent, even if the disturbed area would be later restored,  
 42 because there is no basis for assuming that the restored habitat would still be suitable for the  
 43 affected species. Indirect effects, such as the predicted shifts in salinities or increased erosion in  
 44 wetlands, have been assessed qualitatively.

## 1 **Wildlife Species**

2 For noncovered wildlife species, ICF EIR/EIS staff described relationships between natural  
3 communities and species habitat that were developed based on literature and review of species  
4 databases, including CNDDDB and California Wildlife Habitat Relationships (CWHR), and that are  
5 discussed in Section 12.1.3.2. ICF GIS staff developed habitat models for noncovered species for use  
6 in determining effects following the descriptions provided in Section 12.1.3.2 and in coordination  
7 with ICF biologists.

8 Changes in salinity, selenium and methylmercury and their potential effects on noncovered species  
9 have been assessed qualitatively based on extrapolation of water quality modeling results. These  
10 potential effects are based on salinity modeling results that were used to predict the extent of  
11 available habitat for species that depend on brackish or freshwater tidal emergent wetland, as well  
12 as modeling results for selenium and methylmercury (see Chapter 8, *Water Quality*, and BDCP  
13 Appendix 5.D, *Contaminants*).

## 14 **Common Species**

15 Common plant and wildlife species are considered in the context of project effects on natural  
16 communities. There is a very wide range in natural communities and associated common species in  
17 the study area. To the extent that natural communities are directly or indirectly affected by BDCP  
18 actions, the associated common species are also affected. The potential for effects on these common  
19 species are offset to varying degrees by the long-term conservation strategies contained in the BDCP  
20 and the habitat protection and restoration that is envisioned in those conservation strategies.

## 21 **Wildlife Corridors**

22 The potential effects of the alternatives on wildlife corridors in the study area were primarily  
23 evaluated using GIS data from the California Essential Habitat Connectivity (CEHC) Project and from  
24 a landscape linkage analysis conducted for the BDCP (see BDCP Chapter 3, Section 3.2.5, *Landscape*  
25 *Linkages*). This information was used to determine if any of the BDCP actions would result in  
26 barriers across known or potential natural lands that serve as wildlife corridors or conflict with  
27 BDCP Objective L3.1 and siting and reserve design criteria defined in *CM3 Natural Communities*  
28 *Protection and Restoration*. The alternatives were also evaluated for effects on wildlife corridors by  
29 reviewing aerial imagery with the proposed conveyance facilities alternatives, restoration  
30 opportunity areas, the natural community data, CNDDDB records, and data from DHCCP surveys.  
31 Effects on wildlife corridors for individual species are addressed in more detail in their respective  
32 effects discussions.

33 The CEHC Project was commissioned by the California Department of Transportation and CDFW  
34 with the purpose of making transportation and land-use planning more efficient and less costly,  
35 while helping reduce dangerous wildlife-vehicle collisions (Spencer et al 2010). The CEHC identified  
36 natural blocks of habitat across California and areas that potentially provide linkages between these  
37 blocks. The CEHC identifies these areas as Essential Connectivity Areas (ECAs). The ECAs were not  
38 developed for the purpose of defining areas subject to specific regulations by the CDFW or other  
39 agencies. The ECAs are identified as lands likely to be important to wildlife movement between  
40 large, mostly natural areas at the statewide level. The ECAs form a functional network of wildlands  
41 that are considered important to the continued support of California's diverse natural communities.  
42 The ECAs were not developed for the needs of particular species but were based primarily on the  
43 concept of ecological integrity, which considers the degree of land conversion, residential housing

1 impacts, road impacts, and status of forest structure (for forested areas) (Spencer et al 2010). In  
 2 addition, consideration was given to the degree of conservation protection and areas known to  
 3 support high biological values, such as mapped critical habitat and hotspots of species endemism  
 4 (Spencer et al 2010). The ECAs are intended as placeholder polygons that can inform land-planning  
 5 efforts, but they should eventually be replaced by more detailed linkage designs, developed at finer  
 6 resolution at the regional and ultimately local scale based on the needs of particular species and  
 7 ecological processes.

8 With this in mind, the ECAs were overlain on the study area to identify whether these general areas  
 9 represent potential habitat linkages for wildlife that occur within or likely disperse through the  
 10 study area. Four general areas were identified within the study area that contain ECAs (Figure 12-2).  
 11 The first area is composed of three separate ECAs that converge in the Yolo Bypass: one coming  
 12 from the north (Yolo Bypass-Sacramento Bypass ECA), one coming from the south (Little Holland  
 13 Tract/Yolo Bypass-Yolo Bypass ECA), and one from the east from CZ 4, across CZ 3, linking the Yolo  
 14 Bypass to Stone Lakes (Stone Lake-Yolo Bypass ECA). Another ECA was identified coming into CZ 4  
 15 from the east, generally following the Cosumnes Preserve and terminating at I-5 (Bear Slough-  
 16 Browns Creek ECA). Another was identified in the central Delta generally running north-south from  
 17 CZ 5 into CZ 6, from Staten Island to Mandeville Island (Mandeville Island-Staten Island ECA). The  
 18 last area is in CZ 11 and consists of an ECA coming into Suisun Marsh from the northwest (Grizzly  
 19 Island-Lake Marie ECA).

20 CDFW staff participating in the development of the BDCP identified potential linkages important for  
 21 covered species for incorporation into the reserve design process (see BDCP Chapter 3, Section  
 22 3.2.5). These linkages were inferred from the BDCP land cover data, species occurrence data, and  
 23 covered species habitat models (see BDCP Figure 3.2-16). These linkages were drawn at a regional  
 24 level as broad swaths of natural land cover types rather than specific alignments or corridors. Two  
 25 types of linkages were identified in the BDCP: regional connections, which focus on maintaining  
 26 linkages with areas outside the Plan Area, and connections within the Plan Area, which focus on  
 27 linking populations within the Plan Area. These linkages were developed with individual species or  
 28 a suite of species in mind. The purpose and likely benefit of each linkage shown in BDCP Figure 3.2-  
 29 16 are presented in BDCP Chapter 3, Table 3.2-3. A summary of the purpose for and a list of the  
 30 covered species likely to benefit from the 11 linkages is presented below.

### 31 **Regional Connections**

- 32 1. *Jepson Prairie* – Provide connectivity within Jepson Prairie and between CZs 1 and 11; benefit  
 33 vernal pool crustaceans and plants, and California tiger salamander.
- 34 2. *West to Contra Costa County* – Provide connectivity between the Plan Area and protected lands  
 35 in East Contra Costa County; benefit vernal pool crustaceans and plants, alkali seasonal wetland  
 36 plants, California red-legged frog, California tiger salamander, and San Joaquin kit fox.
- 37 3. *Yolo Bypass* – Provide connectivity for adult fish migration through Yolo Bypass; benefit adult  
 38 salmonids and sturgeon, and juvenile salmonids and Sacramento splittail.
- 39 4. *San Joaquin River to the south* – Provide connectivity for natural community and species habitat  
 40 functions; benefit riparian brush rabbit, riparian woodrat, least Bell's vireo, yellow-breasted  
 41 chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite.



## 1 Connections within the Plan Area

- 2 5. *San Joaquin River* – Provide aquatic and riparian connectivity along the San Joaquin River;  
3 benefit riparian brush rabbit, riparian woodrat, least Bell’s vireo, yellow-breasted chat, yellow-  
4 billed cuckoo, Swainson’s hawk, and white-tailed kite.
- 5 6. *Middle River* – Provide riparian connectivity along the Middle River; benefit riparian brush  
6 rabbit, riparian woodrat, least Bell’s vireo, yellow-breasted chat, yellow-billed cuckoo,  
7 Swainson’s hawk, and white-tailed kite.
- 8 7. *Old River* – Provide riparian connectivity along the Old River from San Joaquin River to Clifton  
9 Court Forebay; benefit riparian brush rabbit, riparian woodrat, least Bell’s vireo, yellow-  
10 breasted chat, yellow-billed cuckoo, Swainson’s hawk, and white-tailed kite.
- 11 8. *Deep Water Ship Channel* – Provide direct route for fish migration along San Joaquin River to  
12 spawning habitat upstream of Stockton; benefit Chinook salmon, steelhead, green sturgeon, and  
13 white sturgeon.
- 14 9. *Sacramento River* – Provide sufficient flows through Sacramento River downstream of North  
15 Delta intakes and limit entrainment to retain movement capacity for covered fish; benefit delta  
16 smelt, longfin smelt, Chinook salmon, steelhead, green sturgeon, and white sturgeon.
- 17 10. *Cosumnes to Stone Lakes* – Provide at least two greater sandhill crane roosting and foraging sites  
18 connecting the population in the vicinity of Cosumnes River Preserve with the population in the  
19 vicinity of Stone Lakes NWR.
- 20 11. *White Slough to Stone Lakes* – Provide giant garter snake habitat connecting the White Slough  
21 population to habitat in the Stone Lakes area

22 The linkages depicted in BDCP Figure 3.2-2 are included in Figure 12-2 for the purpose of  
23 identifying potential conflicts between wildlife corridors to be enhanced and developed under *CM3*  
24 *Natural Communities Protection and Restoration* and the CM1 alternatives being considered in the  
25 EIR/EIS. Where applicable, these potential conflicts are also addressed in the effects discussions for  
26 individual terrestrial species.

### 27 12.3.2.4 Methods Used to Assess Wetlands and Other Waters of the United 28 States

29 The term *waters of the United States* is an encompassing term used by USACE for areas that are  
30 subject to federal regulation under Section 404 of the federal Clean Water Act (CWA). Waters of the  
31 United States are categorized as *wetlands* or *other waters of the United States*. Each of these  
32 categories is described below.

33 USACE defines *wetlands* as areas that are inundated or saturated by surface water or groundwater at  
34 a frequency and duration that is sufficient to support, and that under normal circumstances do  
35 support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR  
36 328.3[b]; 40 CFR 230.3). For a wetland to qualify as a jurisdictional aquatic site, and therefore be  
37 subject to regulation under CWA Section 404, it must support a prevalence of hydrophytic  
38 vegetation, hydric soils, and wetland hydrology.

39 On January 9, 2001, a federal court ruling in *Solid Waste Agency of Northern Cook County v. United*  
40 *States Army Corps of Engineers* (121 S.Ct. 675 [2001]) resulted in a determination that isolated  
41 wetlands (e.g., vernal pools) are no longer regulated by USACE under CWA Section 404. Counsel for

1 EPA and USACE published guidance on “[n]on-navigable, isolated [and] intrastate waters” on  
2 January 19, 2001, in response to the ruling. The guidance essentially resulted in a determination that  
3 USACE does not regulate non-navigable, isolated waters. Jurisdictional status would be considered  
4 as part of the wetland delineation and future permitting process for the proposed project.

5 *Other waters of the United States* are water bodies that are regulated under Section 404 of the CWA  
6 but do not typically display all three of the wetland indicators identified above.

7 As stated in Chapter 3, *Description of Alternatives*, this document is intended to provide project-level  
8 CEQA and NEPA analysis for *CM1 Water Facilities and Operation*, and program-level analyses for all  
9 other BDCP covered activities. To support the approval of a water conveyance alternative at the  
10 project level, it will be necessary to consider its effects on wetlands and waters of the United States  
11 at a detailed level. This analysis will be part of the Section 404 Clean Water Act application process,  
12 as is needed to support compliance with the Act, and which must occur prior to issuing a Record of  
13 Decision for the project’s 404 permit action under terms of NEPA. A jurisdictional wetlands  
14 determination has not been undertaken for other elements of the BDCP because more specific detail  
15 must be developed for individual conservation actions before a specific area of effect can be  
16 identified.

17 The wetland classification system used to delineate wetlands and waters of the United States for the  
18 analysis in this chapter is different from that used to develop natural communities in the BDCP. The  
19 BDCP natural communities development process and methods are described in Section 12.3.2.2 of  
20 this chapter. The method for mapping and quantifying potential wetlands and waters of the US for  
21 this EIR/EIS was developed and implemented by DWR. It is based on analysis of electronic  
22 geographic data using a Geographic Information System (GIS). Field data was collected at a limited  
23 number of accessible sites in support of this GIS-based determination.

24 To determine water conveyance alternatives that may affect jurisdictional wetlands and other  
25 waters of the United States, the GIS analysis used a DWR data for the study area and footprints of the  
26 water conveyance system alternatives, digital aerial photographs taken from 2005 to 2010, and  
27 Natural Resources Conservation Service soil data.

28 DWR used aerial photography interpretation in a GIS to delineate potential wetlands within the  
29 Conveyance Planning Areas. Wetland mapping followed protocols developed for the Sacramento-  
30 San Joaquin Delta, which were adapted from the Bay Area Aquatic Resource Inventory (BAARI; San  
31 Francisco Estuary Institute 2011). To identify photographic signatures of natural hydrology under  
32 different precipitation conditions, additional sources of information were also consulted, including  
33 the CDFW GIS dataset showing vegetation and land use for the Sacramento-San Joaquin Delta (“DFG  
34 Vegetation GIS”) (Hickson and Keeler-Wolf 2007), historical aerial imagery available on Google  
35 Earth and the USFWS National Wetland Inventory maps.

36 The features of the proposed EIR/EIS alternatives include canals, tunnels, intakes, forebays,  
37 pumping plants, staging areas, and borrow and spoil areas and are considered to have either  
38 permanent or temporary impacts. These features are stored in a geographic feature class within a  
39 geodatabase and were used to determine the surface impact for each alternative.

40 DWR also consulted NRCS soil maps of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and  
41 Yolo Counties. The map units associated with hydric soils was overlain on the Plan Area map.

42 Because nearly all of the Plan Area is mapped by NRCS as having hydric soils, DWR used aerial  
43 photograph interpretation of vegetation type and landscape position to identify potential

1 jurisdictional wetlands and other waters. Table 12-6 classifies the mapped wetland types with the  
2 corresponding type from the Cowardin classification system (Cowardin et al. 1979). Detailed  
3 descriptions of the mapped wetland types are included in San Francisco Estuary Institute 2011.

4 Field data were collected at a limited number of accessible sites in support of this GIS- based  
5 determination. DWR environmental scientists conducted wetland delineations following the method  
6 in the 1987 *Corps of Engineers Wetland Delineation Manual* (U.S. Army Corps of Engineers 1987) and  
7 the Arid West Supplement (U.S. Army Corps of Engineers 2008) at 26 sites in the spring and summer  
8 of 2013. DWR plotted the locations of the field wetland data points on the wetland map and adjusted  
9 wetland polygons if necessary.

10 To determine effects resulting from CM1 construction, the GIS data layer of potential jurisdictional  
11 wetlands and other waters was intersected with the layer of project footprint surface features for  
12 each proposed EIR/EIS alternative. The resulting polygons identify the areas of potential impacts on  
13 jurisdictional waters. Acreages of each type of impacted wetland were calculated for each  
14 alternative using an Access database tool and are presented in the wetlands and waters of the  
15 United States impact discussions in Section 12.3.3. The GIS data layer of wetlands and other waters  
16 developed in this process includes all potentially jurisdictional waters, including those waters that  
17 may be later determined by USACE to be isolated or otherwise non-jurisdictional. The use of this  
18 methodology and the GIS data layer likely results in an overestimation of the wetlands and waters of  
19 the United States that would be affected and would require permitting. The construction footprints  
20 are expected to be larger than actual design footprints, including the large intake footprints  
21 extending into the Sacramento River. Also, the GIS methodology used to assign a footprint to the  
22 transmission corridors involved creating a continuous band of effect along the entire alignment  
23 rather than attempting to place individual transmission tower footprints along the alignment.  
24 Finally, the potential jurisdictional wetlands mapping included a delineation of all agricultural-  
25 related ditches and canals; some of these waterways are likely to be determined non-jurisdictional  
26 during the permitting process.

1 **Table 12-6. Mapped Land Cover Types that are Potentially Jurisdictional Wetlands and Other Waters**

Potential Wetland or Other Waters	Mapped Land Cover Type	Cowardin Code(s)	Cowardin Type(s)
<b>Open Water</b>			
Nontidal Flow	Channel unnatural	R4SB5x	Riverine intermittent streambed mud excavated
Muted Tidal Flow	Lagoon open water unnatural	R1UBV	Riverine tidal unconsolidated bottom permanently flooded-tidal
Tidal Flow	Tidal channel	R1UBV	Riverine tidal unconsolidated bottom permanently flooded-tidal
	Tidal channel unnatural	R1UBVx	Riverine tidal unconsolidated bottom permanently flooded-tidal excavated
Pond or Lake (nontidal)	Depression open water unnatural	PUBHh or PUSCh or PUSKh	Palustrine unconsolidated bottom perm flooded diked/impounded or Palustrine unconsolidated shore seasonally flooded diked/impounded or Palustrine unconsolidated shore artificially flooded diked/impounded
	Lacustrine open water unnatural	L1UBH(h) or L2UBH(h) or L2USC(h)	Lacustrine limnetic unconsolidated bottom permanently flooded diked/impounded or Lacustrine littoral unconsolidated bottom permanently flooded diked/impounded or Lacustrine limnetic unconsolidated shore seasonally flooded diked/impounded
<b>Wetland</b>			
Nontidal Wetland	Channel vegetation unnatural	PEM1 or PEM2 or PSS or PFO	Palustrine persistent emergent or Palustrine non persistent emergent or Palustrine scrub-scrub regularly flooded or Palustrine forested regularly flooded
	Depression vegetation unnatural	PEM1 or PEM2 or PSS or PFO	Palustrine persistent emergent or Palustrine non persistent emergent or Palustrine scrub-scrub or Palustrine forested
	Lacustrine vegetation unnatural	PEM1 or PEM2 or PSS or PFO	Palustrine persistent emergent or Palustrine non persistent emergent or Palustrine scrub-scrub or Palustrine forested
	Seep unnatural	PSSKd or PFOkd or PEMKd	Palustrine scrub-scrub artificially flooded partially drained/ditched or Forested artificially flooded partially drained/ditched or Emergent wetland artificially flooded partially drained/ditched
Tidal Wetland	Lagoon vegetation unnatural	PEM1 or PEM2 or PSS or PFO	Palustrine persistent emergent or Palustrine non persistent emergent or Palustrine scrub-scrub or Palustrine forested
	Tidal vegetation	PEM1N or PSSN or PFON	Palustrine emergent persistent regularly flooded or Palustrine scrub-scrub regularly flooded or Palustrine forested regularly flooded
Seasonal Wetland	Vernal pool	PEM2C	Palustrine emergent nonpersistent seasonally flooded
	Vernal pool complex	PEM2C	Palustrine emergent nonpersistent seasonally flooded
	Wet meadow unnatural	PEMBf	Palustrine emergent saturated farmed
	Playa unvegetated unnatural	PUSC1	Palustrine unconsolidated shore seasonally flooded hypersaline

Source: Witzman, pers. comm.

1 The habitat protection and restoration activities associated with other BDCP conservation measures  
2 (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of the  
3 United States in the study area through the course of the BDCP protection and restoration program.  
4 Because these conservation measures have not been defined to the level of site-specific footprints, it  
5 is not possible to delineate and quantify these effects in detail. Several of the conservation measures  
6 (CM2, CM4 and CM5) have been described with theoretical footprints for purposes of the effects  
7 analysis contained in Chapter 5 of the BDCP. These theoretical footprints have been used to predict  
8 the acres of natural communities that would be affected through loss or conversion, which gives  
9 some indication of jurisdictional wetland effects. Any CM2–CM10 effects ascribed to tidal perennial  
10 aquatic, tidal brackish emergent, tidal freshwater emergent, other natural seasonal, nontidal  
11 freshwater perennial emergent, and nontidal perennial aquatic wetlands natural communities are  
12 likely to also be effects on wetlands and other waters of the United States. Effects ascribed to other  
13 natural communities and land cover types with small jurisdictional wetland components  
14 (valley/foothill riparian, alkali seasonal wetland complex, vernal pool complex, managed wetland,  
15 grassland and cultivated lands) are not easily converted to effects on wetlands and other waters of  
16 the United States by the use of theoretical footprints. Because of this lack of detail, a programmatic  
17 assessment is provided for these other conservation measures. In the programmatic impact analysis,  
18 it has been assumed that 100% of the predominantly wetland natural communities mentioned  
19 above and 10% of all of the non-wetland natural communities mentioned above would qualify as  
20 wetlands or other waters of the United States under the CWA.

### 21 **12.3.2.5 Methods Used to Consider Mitigation**

22 The potential environmental effects of each BDCP alternative have been analyzed independently  
23 below. In many cases, the potential effects on individual natural communities or special-status  
24 species created by each BDCP element (the conservation measures) have also been independently  
25 identified. In most cases, these independent effects have been compiled into a summary conclusion.  
26 All effects identified as adverse and potentially significant have been evaluated for the feasibility of  
27 mitigation after first considering whether avoidance and minimization measures (AMMs) and the  
28 conservation measures built into the BDCP would lessen the significant adverse environmental  
29 effects. Permanent and temporary impacts have been treated the same in considering the need for  
30 mitigation.

31 To consider AMMs as a source of avoiding or reducing effects, each AMM was reviewed for its  
32 relevance to the impact (see BDCP Appendix 3.C, *Avoidance and Minimization Measures*, for a full list  
33 of AMMs). If the measure was deemed capable of avoiding or reducing significant impacts, it was  
34 identified in the analysis.

35 The second consideration was the near-term and long-term protection and restoration activities  
36 contained in BDCP conservation measures and biological goals and objectives (BGOs). Each of these  
37 activities was reviewed for its relevance to the effect. Where relevant, the magnitude of each  
38 protection and restoration activity was considered in relation to the potential effect. Where the  
39 potential for significant environmental effects remained despite the conservation measures and  
40 AMMs, specific mitigation measures were identified.

41 The BDCP includes a net effects analysis that estimates beneficial effects of the Plan (see BDCP  
42 Chapter 5, *Effects Analysis*, Tables 5.6-7 and 5.6-8). This net effects analysis was reviewed in the  
43 process of developing the EIR/EIS analyses. However, the firm commitments of the conservation

1 measures and BGOs in the BDCP were the principal elements in developing CEQA and NEPA  
2 conclusions. Where BDCP effects are related to construction of the water conveyance facilities and  
3 are likely to involve site-specific protection or restoration activities, the text refers the reader to  
4 Appendix 12D, *Feasibility Assessment of Conservation Measures Offsetting Water Conveyance Facilities*  
5 *Construction Impacts on Terrestrial Biological Resources*. This appendix contains an analysis of the  
6 BDCP's near-term conservation measures and their ability to offset the effects of water conveyance  
7 facilities construction on terrestrial biological resources. The analysis includes a consideration of the  
8 feasibility of the restoration and protection actions in light of the project-specific level of analysis  
9 that has been conducted for the water conveyance facilities. The content of Appendix 12D has been  
10 closely coordinated with the monitoring and adaptive management program developed for the  
11 BDCP.

12 The process used in Appendix 12D to determine whether the BDCP near-term protection and  
13 restoration actions would sufficiently offset water conveyance facilities' effects on natural  
14 communities includes an initial comparison of water conveyance facilities' near-term effects with  
15 the total near-term natural community protection and restoration goals contained in the Plan (see  
16 Tables 12D-9 to 12D-13 in Appendix 12D, *Feasibility Assessment of Conservation Measures Offsetting*  
17 *Water Conveyance Facilities Construction Impacts on Terrestrial Biological Resources*). Because a  
18 project-level of analysis has been applied to the water conveyance element of the Plan, the  
19 comparison has also been made between a typical project-level mitigation ratio for the natural  
20 community and the near-term protection and restoration goals. If these goals meet or exceed the  
21 typical project-level mitigation requirement, and if the BDCP includes a commitment to timely  
22 conservation actions that address any loss in habitat value during the near-term timeframe, the  
23 conservation actions have been considered sufficient to offset the effect. The timeliness of  
24 conservation actions has been judged independently for each natural community. The Biological  
25 Goals and Objectives outlined in BDCP Chapter 3, *Conservation Strategy*, have also been reviewed for  
26 more specific information that has been developed to guide protection and restoration actions. The  
27 general availability of lands to be used as compensation for water conveyance effects has also been  
28 evaluated in Appendix 12D.

29 The process used in Appendix 12D to determine whether BDCP near-term conservation actions  
30 would sufficiently offset water conveyance effects on special-status wildlife and plants is similar to  
31 that for natural communities, except that effects are described in terms of modeled habitat lost.  
32 These losses have been compared with the BDCP planned conservation of natural communities that  
33 make up that modeled habitat and the BDCP goals and objectives that specify the timing, location  
34 and nature of habitat improvements needed to offset effects on special-status species. As with  
35 natural communities, the appropriateness of the timing of conservation actions is also considered in  
36 determining the sufficiency of near-term offsets.

37 The typical mitigation ratios contained in Tables 12D-9 to 12D-13 in Appendix 12D have been used  
38 only for analytical purposes in the EIR/EIS to determine the sufficiency of the BDCP conservation  
39 strategy as CEQA and NEPA mitigation (i.e., whether the BDCP conservation strategy includes  
40 sufficient land acquisition and restoration to adequately mitigate the impacts of CM1 for purposes of  
41 CEQA and NEPA). These ratios reflect and are consistent with the professional judgment and  
42 scientific knowledge of the biologists who worked on this chapter and the BDCP, and reflect their  
43 collective experience in environmental permitting, preparation of HCPs/NCCPs and similar natural  
44 resource management plans, and preparation of CEQA documents for state, regional, and local  
45 agencies. It is recognized that there is a sizeable range in mitigation ratios used in environmental  
46 documents. The ratios generally depend on level of ecological function lost and level of confidence in

1 the ability of the mitigation measures to replace that function. Given that many of the impacts of  
2 implementing the BDCP would occur on degraded habitats and the BDCP conservation measures  
3 include commitments to specific performance standards, the ratios used in this chapter are  
4 considered reasonable.

5 Mitigation ratios were not used to develop the BDCP conservation strategy for purposes of  
6 complying with ESA or NCCPA; therefore, these mitigation ratios are not mentioned in BDCP  
7 Chapter 3, and would not be used to ensure plan compliance with those two statutes. Instead,  
8 compliance with ESA and NCCPA would be determined by ensuring rough proportionality between  
9 effects and conservation as a whole.

10 The typical mitigation ratios used in Appendix 12D take into account several factors typically used  
11 during project-level evaluations.

- 12 • The sensitivity and rarity of natural communities. More sensitive or rare communities have  
13 higher ratios.
- 14 • The importance of natural communities as habitat for the covered species. Communities that  
15 support more covered species have higher ratios.
- 16 • Threats to the natural community and the need for preservation to help alleviate those threats.  
17 Communities with more threats have a higher preservation ratio.
- 18 • The uncertainty in the success of restoration efforts, including evidence in other areas that  
19 similar restoration works. Communities with more uncertain restoration have a higher  
20 restoration ratio.

21 The difference between the land acquisition and restoration needed to offset construction effects  
22 and that needed for the entire conservation strategy should not alone be viewed as the BDCP's  
23 contribution to recovery (i.e., beyond mitigation). There are many additional components of the  
24 conservation strategy not captured in this analysis that also conserve the covered species and  
25 contribute to their recovery. For example, enhancement and management of natural communities  
26 (CM11), which involves creating specific vegetation structure or composition, would also help to  
27 conserve covered wildlife and plants. See the biological goals and objectives in Section 3.3 of the  
28 BDCP for a full description of all Plan requirements that would help to conserve the covered species.  
29 The numeric targets for natural community acquisition and restoration are only a part of those  
30 requirements.

31 As discussed above, offsets for impacts on terrestrial biological resources generally take the form of  
32 accelerated efforts to restore or protect similar biological resources as part of the overall  
33 conservation plan. The proposed timing of these restoration and protection measures are  
34 documented (in 5-year increments) in Chapter 3, Table 3-4, of this document, and in BDCP Chapter  
35 6, Table 6-2. The authors of this chapter have compared the restoration and protection timing  
36 indicated in these tables with the anticipated timing of construction and restoration that might  
37 eliminate habitat. Although it would be desirable from a habitat-availability perspective to have the  
38 restoration and protection offsets in place simultaneously with the occurrence of impacts (this is not  
39 a regulatory requirement), in some instances there may be short-term lag times between the  
40 occurrence of the impacts, and the maturation of restored habitats and protection and enhancement  
41 of existing habitats. Such short-term delays have been accounted for in the formulation of offset  
42 strategies such as the use of ratios for restoration or protection. Except where specifically noted in  
43 impact discussions later in this chapter, such minor delays should not by themselves lead to short-

1 term or permanent adverse or significant impacts. Because of the availability within the study area  
2 of like habitats to sustain affected species until the offset lands are fully functional, in only a few  
3 instances, identified in specific impact discussions below, would such delays lead to short-term  
4 adverse or significant effects on species. For example, although there may be short-term delays in  
5 the creation of restored wetlands, the species that inhabit the impacted wetlands would persist in  
6 other wetlands available within the study area until offset lands are functional. Except where  
7 specifically noted later in this chapter, these short-term losses are not expected to be adverse or  
8 significant because the acreages involved would be relatively small compared with total suitable  
9 habitat within the study area and because the short-term losses would primarily be associated with  
10 lower value habitat. In addition, restoration under CM2 through CM11 would offset these losses  
11 with higher value habitats.

## 12 **12.3.3 Effects and Mitigation Approaches**

### 13 **12.3.3.1 No Action Alternative**

14 The No Action Alternative describes expected future conditions for terrestrial biological resources  
15 resulting from a continuation of existing policies and programs by federal, state, and local agencies  
16 in the absence of the BDCP alternatives. As described in Chapter 3, *Description of Alternatives*, the No  
17 Action Alternative analysis takes into consideration Existing Conditions, programs already adopted  
18 during the early stages of development of the EIR/EIS, facilities that were permitted or under  
19 construction during the early stages of development of the EIR/EIS, and foreseeable changes in land  
20 and water management associated with existing plans, policies and legal mandates that would occur  
21 with or without the BDCP. The assumptions that are included in the No Action alternative are  
22 further defined in Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project*  
23 *Alternative, and Cumulative Impact Conditions*. The appendix includes an extensive list of existing  
24 programs, projects and policies that should be considered in all resource analyses (Tables 3D-2 and  
25 3D-A.). An additional list of programs, projects and policies that were in the process of being  
26 implemented during the early stages of EIR/EIS development and that have been considered under  
27 the No Action Alternative are listed in Table 3D-4. These lists have been reviewed as they relate to  
28 terrestrial biological resources; the projects and programs listed in Table 12-7 are considered the  
29 most relevant to the No Action Alternative discussion in this chapter.

30 For this analysis, it has been assumed that the urban land uses in the study area would be only  
31 slightly modified from those of today because only limited types of development are allowed in the  
32 Primary Zone of the Delta, and urban expansions in the remainder of the study area are difficult to  
33 predict, given the strong influence of economic conditions and local planning restrictions. Two  
34 relatively large proposed urban developments, Mountain House northwest of Tracy and River  
35 Islands, west of Lathrop, are known and have the potential to remove over 7,200 acres of  
36 agricultural land in the southern portion of the study area. There is also the potential that urban  
37 expansion in the lands surrounding the study area could either directly or indirectly affect the  
38 terrestrial biological resources in the study area.



1 **Table 12-7. Programs, Projects, and Policies Included In No Action Alternative for the Terrestrial**  
2 **Biological Resources Analysis**

Agency	Program/Project/Policy	Comments
Alameda County	East Alameda County Conservation Strategy	Approved in 2011. There is less than a 2% overlap with BDCP and this overlap only occurs in one conservation zone. Currently no planned conservation activity in the overlap area.
California Department of Fish and Wildlife	Calhoun Cut/Lindsey Slough Restoration	Increase intertidal marsh habitat and adjacent riparian habitat on 927 acres in Cache Slough ROA.
California Department of Fish and Wildlife	Ecosystem Restoration Program Conservation Strategy	Created in 2000. Ongoing program to preserve, restore, and enhance terrestrial natural communities and ecosystems in the San Francisco Bay and Sacramento-San Joaquin Delta. Protected and restored more than 150,000 acres of habitat, including 3,900 acres and 59 miles of riparian and riverine aquatic habitat (as of 2010) after 7 of the planned 30 years of the project.
California Department of Fish and Wildlife	Fremont Landing Conservation Bank	Established in 2006. Enhances 40 acres of riparian habitat and restores 60 acres of riparian woodlands and sloughs.
California Department of Fish and Wildlife	Grizzly Island Wildlife Area Land Management Plan	Estuarine marsh that contains about 15,300 acres of wildlife habitat. Will continue to be managed for wildlife.
California Department of Fish and Wildlife	Lower Sherman Island Wildlife Area Land Management Plan	Ongoing program. Directs habitat and species management on 3,100 acres of marsh and open water.
California Department of Fish and Wildlife	Private Lands Incentive Program	Includes 29,000 acres of habitat in Tulare Basin, Grasslands, Suisun Marsh, and Sacramento Valley. Encourages development and enhancement of habitat for shorebirds and waterfowl on private lands.
California Department of Fish and Wildlife	Restoring Ecosystem Integrity in the Northwest Delta	Originally funded in 2004. Ongoing program. Focused on habitat restoration. Currently concentrating acquisition efforts on 3 specific properties consisting of about 150 acres and baseline monitoring.
California Department of Fish and Wildlife	Staten Island Wildlife-Friendly Farming Demonstration	Ongoing program. Objective is ecosystem restoration; 2,500–5,000 acres of corn will be flooded to increase habitat availability and to improve wildlife-friendly agriculture to foster recovery of at-risk species and to investigate effects of agriculture on water quality.
California Department of Fish and Wildlife	Yolo Bypass Wildlife Area Land Management Plan	Ongoing program. Provides for multiple use management of 16,000 acres of mixed agricultural, grassland and managed wetland habitats.

Agency	Program/Project/Policy	Comments
California Department of Water Resources	Delta Levees Flood Protection Program	Ongoing program. Includes modification to Delta levees within the Sacramento-San Joaquin Delta and portions of the Suisun Marsh. The project works with 60 reclamation districts and strives to complete levee rehabilitation projects with no net loss of habitat in the Delta.
California Department of Water Resources	Levee Repair-Levee Evaluation Program	Ongoing program. Upgrading levees along the Sacramento and San Joaquin Rivers and Delta; 1,600 miles of levees included in Central Valley.
California Department of Water Resources and MOA Partners	Lower Yolo Restoration Project	In Cache Slough ROA, reintroduce tidal action to half of 3,408-acre Yolo Ranch.
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	Converts 240–840 acres from agricultural uses and grazing to wetland, riparian, and upland habitats.
California Partners in Flight	Riparian Habitat Joint Venture	Ongoing program. Promotes and supports riparian conservation and enhancement, contributes to flood control and maximizes habitat available to wildlife. Protects and restores riparian areas with intact adjacent upland habitats.
Central Valley Joint Venture Program	Central Valley Joint Venture	Ongoing program. Strives to protect, restore, and enhance wetlands. Contributes to habitat conservation on a total of 714,000 acres in California.
Contra Costa County and East Contra Costa County Habitat Conservancy	East Contra Costa County HCP/NCCP	Approved in 2007. Encompasses about 175,000 inventory acres and contains 30,000 acres of preserved land. Purpose is to purchase, restore, and permanently protect large, interconnected and biologically rich blocks of habitat. Occurs almost entirely out of the BDCP boundary.
Contra Costa Water District	Contra Costa Canal Fish Screen Project	Completed in 2011. Designed to restore Delta ecosystems. Minor terrestrial impact at fish screen sites.
Contra Costa Water District, U.S. Bureau of Reclamation, and California Department of Water Resources	Contra Costa Water District's Middle River Intake and Pump Station (Alternative Intake Project)	Completed in 2010. Resulted in permanent conversion of 6–8 acres of rural agricultural land. Features about 12,000 feet of pipe across Victoria Island and under Old River.

Agency	Program/Project/Policy	Comments
National Marine Fisheries Service, U.S. Bureau of Reclamation, and Department of Water Resources	Biological Opinion (BiOp) on the Long-Term Operations of the Central Valley Project and State Water Project	Ongoing program. Action area consists of the Oroville Reservoir, Feather River downstream of Oroville, Sacramento River downstream of Feather River, Sacramento-San Joaquin Delta, and adjacent habitats that are dependent on or influenced by waterways. Designed to conserve freshwater, estuarine, nearshore, and offshore sites. Includes 8,000-acre tidal wetland restoration requirement.
Reclamation District 2093	Liberty Island Conservation Bank	Under implementation. Permits and approvals acquired in 2009. Project site is on northern tip of Liberty Island, within the southern area of the Yolo Bypass where it flows into the northwest Sacramento/San Joaquin River Delta. Over 160 acres in the project site with about 50 proposed to be converted to open water channels, emergent marsh wetland, and riparian habitat. Focuses on Delta fish habitat but will restore 2.7 acres of riparian habitat.
Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, and U.S. Army Corps of Engineers	Flood Management Program	Ongoing program. Supports flood management planning in Sacramento and San Joaquin Valleys. To be updated every 5 years with first update to be completed in 2017. Combined total of about 2.2 million acres of land within the Central Valley.
San Joaquin Council of Governments	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	Ongoing program. Approved in 2011. Includes most of San Joaquin County. Assumes 100,000 acres of open land conversion and provides about 100,000 acres of preserves. About 35% of this plan overlaps with BDCP so competition for restoration sites and land acquisition would exist. There are 39 covered species in common and very similar land acquisition targets, such as riparian forests and grasslands.
U.S. Army Corps of Engineers	CALFED Levee Stability Program	Includes maintaining and improving levee stability in the Delta. Long-term strategy will include ecosystem restoration. Partially funds McCormack-Williamson Tract Restoration in Cosumnes-Mokelumne ROA; 1,500 acres of tidal and floodplain restoration.
U.S. Bureau of Reclamation	Delta Mendota Canal/California Aqueduct Intertie	Construction completed in April 2012. Includes construction of a pump and 500-foot pipeline between the two canals near the Jones Pumping Plant. No special-status plant community affected.

Agency	Program/Project/Policy	Comments
U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Department of Water Resources and Department of Fish and Wildlife	San Joaquin River Restoration Program	Initiated in 2006. Ongoing program; 150 miles of the river is planned for restoration, including within the BDCP Plan Area.
U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation and California Department of Fish and Wildlife	San Joaquin Basin Action Plan	Includes a habitat acquisition and wetland enhancement project on 23,500 acres in northern San Joaquin River basin.
U.S. Fish and Wildlife Service	Recovery Plan for Sacramento-San Joaquin Delta Native Fishes	Includes developing additional shallow water habitat, riparian vegetation zones and tidal marsh to restore wetland habitats throughout the Bay-Delta ecosystem.
U.S. Fish and Wildlife Service	Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan	Drafted in 2006. Ongoing program. Directs habitat and species management on 17,600 acres of grassland, managed wetland and riparian habitat.
U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, and Department of Water Resources	Biological Opinion (BiOp) on the Long-Term Operations of the Central Valley Project and State Water Project (Delta smelt)	Ongoing program. Directs restoration of at least 8,000 acres of intertidal and related subtidal habitat for delta smelt in the Delta and Suisun Marsh.
Zone 7 Water Agency and Department of Water Resources	South Bay Aqueduct Improvement and Enlargement Project	Under construction. Estimated completion in 2012. More than 40 miles of pipelines and a 500 acre-foot reservoir will be built. No significant effects expected to terrestrial biology habitats.

1

2 **Effects on Terrestrial Natural Communities**

3 Changes to land use and land management have the greatest potential to affect terrestrial natural  
4 communities and land cover types in the study area if the current water management policies and  
5 activities associated with the plans and programs in Table 12-7 continue in the absence of the BDCP  
6 action alternatives. Under the No Action Alternative, local, state and federal programs to preserve  
7 open space and agricultural lands would continue to be implemented, as described in Chapter 13,  
8 *Land Use*. The management of state- and federally owned wildlife areas, including Grizzly Island,  
9 Sherman Island and Yolo Bypass State Wildlife Areas, and Stone Lakes NWR, would continue to  
10 focus on multiple uses, including wildlife habitat improvement, public access for wildlife viewing,  
11 wildlife-friendly agricultural production and hunting opportunities. These areas are primarily  
12 managed wetlands and cultivated land, with smaller areas of tidal and nontidal wetlands, grassland  
13 and small linear patches of valley/foothill riparian habitat. These areas will continue to be managed  
14 and enhanced to benefit both special-status and common wildlife that use these natural  
15 communities. The many privately owned managed wetlands would continue to support primarily  
16 wintering waterfowl and associated aquatic and terrestrial species. The urban and infrastructure  
17 land uses in the Delta would be only slightly modified from those of today for the reasons stated

1 above. Any urban expansion would likely be on the periphery of existing towns and cities and would  
2 result in the gradual removal of primarily cultivated land and nonnative grassland.

3 A continuation of current water management strategies used by state, federal and local water  
4 purveyors would not significantly modify the principal natural communities in the study area.  
5 Periodic levee and channel maintenance activities associated with current strategies would result in  
6 localized disturbances to valley/foothill riparian, grassland and tidal perennial aquatic natural  
7 communities, and to a lesser extent to tidal brackish and tidal freshwater emergent wetlands. To the  
8 extent that ongoing levee repair and replacement involves use of reinforcing rock and  
9 discouragement of replanting streamside vegetation, there could be a gradual decline in the extent  
10 and value of valley/foothill riparian habitat and grassland along minor and major waterways.  
11 Several of the water management projects listed in Table 12-7 require localized removal of natural  
12 communities and agricultural land for expanding infrastructure. Most of these activities are on the  
13 periphery or just outside of the study area, including the Contra Costa Water District fish screen and  
14 diversion structure modifications, the Delta Mendota Canal/California Aqueduct intertie project, and  
15 the South Bay Aqueduct improvement project.

16 There are many programs either under way or in the planning stages to increase wetland and  
17 riparian habitats in the study area. Some of the larger programs are listed below.

- 18 • DWR Dutch Slough Tidal Marsh Restoration Project (1,165 acres to wetlands and uplands).
- 19 • DWR Lower Yolo Restoration Project (3,408 acres of tidal and riparian restoration on Yolo  
20 Ranch)
- 21 • USFWS/Reclamation/DFG San Joaquin Basin Action Plan (23,500 acres of land acquisition and  
22 wetland enhancement).
- 23 • USFWS Recovery Plan for Sacramento-San Joaquin Delta native fishes (creation of shallow water  
24 habitat, riparian vegetation, tidal marsh).
- 25 • CDFW Lower Sherman Island Wildlife Area Land Management Plan (3,100 acres of marsh and  
26 open water management).
- 27 • CDFW Yolo Bypass Wildlife Area Management Plan (16,000 acres of managed agricultural,  
28 wetland, grassland and vernal pool complex habitat).
- 29 • CDFW Grizzly Island Wildlife Area Management Plan (15,300 acres of estuarine marsh managed  
30 for waterfowl and wetland habitats).
- 31 • U.S. Army Corps of Engineers McCormack-Williamson Tract Restoration (1,500 acres of tidal  
32 restoration in the east Delta).
- 33 • USFWS Stone Lakes Wildlife Refuge Management Plan (18,000 acres of managed agricultural,  
34 wetland, grassland and riparian habitats).

35 Ongoing implementation of these plans and programs would result in some decline of cultivated  
36 lands in the study area. There are also plans, however, to continue and expand partnerships with  
37 agricultural interests to manage croplands for wildlife-friendly crops.

38 In the longer term, both gradual and catastrophic natural phenomena could affect the mix of open  
39 water, tidal wetland, agricultural and riparian forest natural communities in the study area through  
40 continued land subsidence on Delta islands, levee degradation and potential failure from floods or  
41 seismic events, and climate change (see Appendix 3E, *Potential Seismic and Climate Change Risks to*

1 *SWP/CVP Water Supplies*). Based on trends in land use conversions in the Delta during recent years,  
2 these natural changes would result in the conversion of additional cultivated land and possibly  
3 managed wetlands to tidal wetlands and open water.

#### 4 **Effects on Special-Status and Common Wildlife and Plants**

5 The gradual conversion of cultivated land, managed wetland and grassland in the study area, and the  
6 loss of Delta island habitat to inundation due to levee failure, have the potential to affect specific  
7 special-status and common wildlife and plants, depending on the location of these effects. Loss of  
8 certain types of cultivated land could reduce foraging habitat for nesting raptors, including  
9 Swainson's hawk and white-tailed kite, and for over-wintering waterfowl and wading birds,  
10 including greater sandhill crane, greater yellow-legs, snow goose and northern pintail. A large  
11 variety of wintering waterfowl and shorebirds rely on harvested rice and corn fields for a food  
12 source. Managed wetlands serve a similar function. An expansion of tidal wetlands would provide  
13 benefits to species such as salt marsh harvest mouse, California black rail and California clapper rail.  
14 Flooding of Delta islands would result in additional cultivated land losses and would not provide  
15 significant benefit to most terrestrial species, as the study area does not have a shortage of open  
16 water habitat.

#### 17 **Effects of Global Climate Change on Terrestrial Biological Resources**

18 Under the No Action alternative, global climate change is expected to result in many physical  
19 changes to the BDCP Plan Area. From a terrestrial biology perspective, the most significant changes  
20 would include a gradual rise in sea level, increasing water and air temperatures, more frequent  
21 drought and extreme rainfall events, and changes in the hydrologic patterns of the rivers and the  
22 Delta channels that influence the terrestrial and aquatic habitats used by terrestrial plants and  
23 wildlife. The climate change analysis included in Chapter 29 considers sea level increases at levels  
24 ranging from 18 to 55 inches (see Chapter 29, Section 29.5.1.2). Air temperatures are projected to  
25 rise by 2–5 degrees F by 2050 and water temperatures are projected to increase as some proportion  
26 (2–3 degrees F) of the air temperature rise (see Appendix 29C, Section 29C.2.1). The changed  
27 frequency of drought and extreme rainfall events has not been predicted, but is expected to be a  
28 factor in future California conditions with global climate change. Hydrologic conditions in the rivers  
29 and Delta channels are expected to be altered by changes in precipitation patterns, with a portion of  
30 precipitation shifting from snow to rainfall in the winter months. This would increase river flows in  
31 winter and early spring, and decrease flows in the remainder of the year as snowmelt runoff  
32 decreases. The changes in river flows would generate subsequent changes in west Delta and Suisun  
33 Marsh salinity levels.

34 The physical changes in conditions in the study area related to the climate change described above,  
35 especially the sea level rise, would change the distribution and value of study area habitats. Sea level  
36 rise is expected to gradually inundate existing habitats on the periphery of the Delta, in the lower  
37 Yolo Bypass, in the Cache Slough/Lindsay Slough area, and the northern and southern edges of  
38 Suisun Marsh. A potential pattern of inundation, which assumes a 55 inch sea level rise, is shown  
39 graphically in Figure 29-1. The effects of climate change on the Plan Area's natural communities and  
40 special-status species are discussed in detail in Appendix 5.A.1 of the BDCP (*Climate Change*  
41 *Implications for Natural Communities and Terrestrial Species*).

42 Tidal brackish and freshwater marsh in Suisun Marsh, the Lindsay Slough/Cache Slough area, and  
43 the lower Yolo Bypass could be gradually inundated and converted to more subtidal habitat. In areas

1 where there is no upland barrier (levees, roads, residential development, agricultural fields), some  
2 portion of the tidal marsh may re-establish upslope with the higher water levels, if there is sufficient  
3 sediment available to provide an appropriate substrate. However, decreases in sediment availability  
4 that have occurred in the Delta and Suisun Marsh over time and that may continue, may not keep  
5 pace if the higher estimated rates of sea level rise occur (Barnard et. al 2013). The result could be a  
6 gradual loss of these tidal marshes in these parts of the study area. Where barriers exist upslope of  
7 existing marsh, the tidal marsh habitat could be gradually inundated and subtidal areas would  
8 remain. Subtidal habitat is less valuable to the special-status and common terrestrial plants and  
9 wildlife of the study area, including ground-nesting birds such as California black rail. Low-lying  
10 upland grassland, seasonal wetlands and riparian areas could also be gradually converted to tidal  
11 marsh, but would be expected to re-establish upslope where open ground exists and there are no  
12 physical barriers. Where these incursions bisect existing wildlife corridors, the ability of certain  
13 species to move and interact with adjacent populations would decrease. Population numbers of  
14 riparian, grassland and tidal marsh species would be likely to decrease and population distribution  
15 would be altered. The habitats adjacent to study area waterways would also be exposed to more  
16 frequent inundation and desiccation as precipitation levels show greater fluctuation.

17 In the Delta, where more of the land is separated from tidal action by man-made levees, sea level  
18 rise would be likely to affect narrower bands of habitat along the inside of these levees as there is a  
19 vertical rise in tidal levels. These narrow bands of habitat include grassland, riparian areas of willow  
20 and brambles, and tidal freshwater marsh. There are few areas in the Delta where the land gradually  
21 slopes away from tidal channels, allowing for some migration of tidal marsh upslope as water levels  
22 gradually rise. These areas are more likely to eventually be converted to subtidal habitat. As with  
23 Suisun Marsh and the lower Yolo Bypass, population numbers of riparian, grassland and tidal marsh  
24 species would be likely to decrease and population distribution would be altered.

25 Appendix 5A.1 of the BDCP describes potential effects of climate change on specific covered species.  
26 Under the No Action Alternative, gradual warming of the environment, sea level rise and a shorter  
27 rain season would place added stress on wetland habitats, especially those under tidal influence.  
28 Special-status plants such as the Suisun marsh aster, Mason's lilaeopsis and Delta tule pea may see a  
29 shrinking of suitable habitat as tidal marsh is inundated. Wetland-associated birds, including  
30 California black rail, California clapper rail, Suisun song sparrow and tri-colored blackbird may lose  
31 nesting and foraging habitat to shrinking tidal marsh in the study area. Shortened rainy seasons may  
32 reduce late spring and summer habitats for aquatic species such as giant garter snake, California  
33 tiger salamander and western pond turtle.

34 Land subsidence, sea level rise, gradual or catastrophic levee failure, or a combination of these  
35 conditions, should they occur, would result in flooding and inundation that could significantly  
36 damage existing facilities and infrastructure, uproot and kill vegetation to an unknown extent,  
37 permanently flood Delta islands, and drastically alter the salinity of Delta waterways and wetlands.  
38 Depending on the extent and duration of flooding, significant short- and long-term changes could  
39 occur in the availability of shallow tidal wetlands, riparian and grassland habitats and managed  
40 lands useful to certain special-status and common species (e.g., cultivated land, managed wetland).  
41 Depending on the amount of human intervention to drain islands and rebuild levees, there may be a  
42 gradual succession of habitats less valuable to the plant and animal species currently relying on the  
43 Delta for growth and seed production, cover, breeding, nesting, resting, movement corridors and  
44 foraging. Refer to Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water*  
45 *Supplies*, for a further discussion of seismic and climate change effects that might occur in the study  
46 area under the no action condition.

1 As described in Chapter 3, *Description of Alternatives*, many of the ongoing programs that influence  
2 the study area include development of future projects that would require additional project-level  
3 environmental review. Future federal actions would be required to comply with NEPA, ESA, and  
4 other federal laws and regulations. Future state and local actions would be required to comply with  
5 CEQA, CESA, and other federal, state and local laws and regulations. Compliance and permit  
6 requirements would be implemented on a case-by-case basis.

7 **NEPA Effects:** The overall direction of existing and ongoing programs and policies that influence  
8 land conversion and land management in the study area is toward maintaining the mix of  
9 agricultural, recreational, water management, and wildlife uses that make the Delta, Yolo Bypass  
10 and Suisun Marsh valuable resources for the entire state. Some actions that will be taken in the  
11 absence of a BDCP will continue to expand natural and manmade terrestrial and wetland habitats  
12 that will benefit the special-status and common plants and wildlife with habitat in the study area.  
13 There is the potential, however, for long-term trends in levee deterioration, global climate change,  
14 and seismic activity that could damage levees and result in significant changes in natural  
15 communities and cultivated lands. Major changes in tidal and nontidal wetland, riparian, managed  
16 wetland and cultivated land habitats would be an adverse effect on terrestrial biological resources.

17 **CEQA Conclusion:** Under the No Action Alternative, existing plans, programs and policies would  
18 affect terrestrial biological resources in the study area in a positive way. Many plans and programs  
19 call for expanded development and management of wetland and riparian habitats and increased  
20 management of cultivated lands for joint benefit to the farmer and wildlife. There would be a  
21 beneficial impact on terrestrial biological resources.

22 In the longer term, there are risks associated with natural processes that could damage or destroy  
23 Delta levees that protect both natural habitats and agricultural lands. The risks include flood-related  
24 levee deterioration, potential for seismically induced levee collapse, and sea level rise associated  
25 with climate change. These long-term risks, if unchecked, could result in a significant impact on the  
26 terrestrial biological resources of the study area.



### 12.3.3.2 Alternative 1A—Dual Conveyance with Pipeline/Tunnel and Intakes 1, 2, 3, 4 and 5 (15,000 cfs; Operational Scenario A)

Section 3.5.2 in Chapter 3, *Description of Alternatives*, provides details of Alternative 1A, and Figure 3-2 depicts the alternative.

#### Natural Communities

##### Tidal Perennial Aquatic

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

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

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

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	48	48	133	133	0	0
CM2	8	8	11	11	9-36	0
CM4	11	18	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>67</b>	<b>76</b>	<b>144</b>	<b>149</b>	<b>9-36</b>	<b>39</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

3

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

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
7 CM4, CM5, and CM6 would permanently affect an estimated 76 acres and temporarily remove 149  
8 acres of tidal perennial aquatic natural community in the study area. These modifications represent  
9 less than 1% of the 86,263 acres of the community that is mapped in the study area. The majority of  
10 the permanent and temporary effects would happen during the first 10 years of Alternative 1A  
11 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.  
12 Natural communities restoration would add 8,300 acres of tidal wetlands, including an estimated  
13 3,400 acres of tidal perennial aquatic natural community during the same period, which would  
14 expand the area of that habitat and offset the losses. The 3,400-acre increase is estimated, based on  
15 modeling reported in BDCP Appendix 3.B, Table 5, by comparing existing Plan Area subtidal habitat  
16 to near-term subtidal habitat with the Plan. The BDCP beneficial effects analysis (BDCP Chapter 5,  
17 Section 5.4.1.2) indicates that, while there would be no minimum restoration requirement for the  
18 tidal perennial aquatic natural community, an estimated approximately 27,000 acres of tidal  
19 perennial aquatic natural community would be restored based on tidal restoration modeling. This  
20 estimate is based on Table 5 in BDCP Appendix 3.B, subtracting late long-term without project  
21 acreage from late long-term acreage with project acreage.

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

- 1       • *CM1 Water Facilities and Operation* Construction of the Alternative 1A water conveyance  
2 facilities would permanently remove 48 acres and temporarily remove 133 acres of tidal  
3 perennial aquatic community. Most of the permanent loss would occur where Intakes 1–5  
4 encroach on the Sacramento River’s east bank between Freeport and Courtland (see Terrestrial  
5 Biology Mapbook, a support document to the EIR/EIS, for a detailed view of proposed facilities  
6 overlain on natural community mapping). The footings and the screens at the intake sites would  
7 be placed into the river margin and would displace moderately deep to shallow, flowing open  
8 water with a mud substrate and very little aquatic vegetation. A small area (less than 1 acre) of  
9 this community would also be lost to intermediate forebay construction approximately 1.2 miles  
10 south of Hood Franklin Road and immediately west of Stone Lakes NWR. The temporary effects  
11 on tidal perennial aquatic habitats would occur at numerous locations, including in the  
12 Sacramento River at Intakes 1–5, and at temporary barge unloading facilities established at five  
13 locations along the tunnel route. The barge unloading construction would temporarily affect the  
14 Sacramento River just downstream of Walnut Grove, the North Mokelumne River adjacent to the  
15 east side of Tyler Island, the San Joaquin River in the Venice Reach just south of Venice Island,  
16 Middle River on the east side of Bacon Island just downstream of Empire Reach, and the North  
17 Victoria Canal between Woodward and Victoria Islands. The details of these locations can be  
18 seen in the Terrestrial Biology Mapbook. These losses would take place during the near-term  
19 construction period.
- 20       • *CM2 Yolo Bypass Fisheries Enhancement* Implementation of CM2 would involve a number of  
21 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
22 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
23 Sacramento Weir improvements. Some of these activities could involve excavation and grading  
24 in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on  
25 hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11  
26 acres could be temporarily removed. This activity would occur primarily in the near-term  
27 timeframe.
- 28       • *CM4 Tidal Natural Communities Restoration* Based on the use of hypothetical restoration  
29 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.  
30 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,  
31 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent  
32 wetlands. Specific locations for these conversions are not known. The 18 acres could remain  
33 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one  
34 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been  
35 taken and the effect has been discussed simultaneously with the habitat losses associated with  
36 other conservation measures. An estimated 65,000 acres of tidal wetlands would be restored  
37 during tidal habitat restoration, consistent with BDCP Objective L1.3. Of these acres, an  
38 estimated 27,000 acres of tidal perennial aquatic habitat would be restored, based on modeling  
39 conducted by ESA PWA (refer to Table 5 in BDCP Appendix 3.B). This restoration would be  
40 consistent with BDCP Objective TPANC1.1. Approximately 3,400 acres of the restoration would  
41 happen during the first 10 years of Alternative 1A implementation, which would coincide with  
42 the timeframe of water conveyance facilities construction. The remaining restoration would be  
43 spread over the following 30 years. Tidal natural communities restoration is expected to be  
44 focused in the ROAs identified in Figure 12-1. Some of the restoration would occur in the lower  
45 Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,  
46 Cosumnes/Mokelumne and West Delta ROAs.

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

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

#### 20      ***Near-Term Timeframe***

21      During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
22      affect the tidal perennial aquatic community through CM1 construction losses (48 acres permanent  
23      and 133 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres  
24      temporary). The habitat would be lost primarily along the Sacramento River at intake sites or in the  
25      northern Yolo Bypass. Approximately 11 acres of the inundation and construction-related effects  
26      from CM4 would occur during the near-term throughout the ROAs mapped in Figure 12-1.

27      The construction losses of this special-status natural community would represent an adverse effect  
28      if they were not offset by avoidance and minimization measures and restoration actions associated  
29      with BDCP conservation components. Loss of tidal perennial aquatic natural community would be  
30      considered both a loss in acreage of a sensitive natural community and a loss of waters of the United  
31      States as defined by Section 404 of the CWA. However, the creation of approximately 3,400 acres of  
32      high-value tidal perennial aquatic natural community as part of CM4 during the first 10 years of  
33      Alternative 1A implementation would offset this near-term loss, avoiding any adverse effect. Typical  
34      project-level mitigation ratios (1:1 for restoration) would indicate 211 acres of restoration would be  
35      needed to offset (i.e., mitigate) the 211 acres of effect (the total permanent and temporary near-term  
36      effects listed in Table 12-1A-1) associated with near-term activities including water conveyance  
37      facilities construction.

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

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1A as a whole would result in relatively minor (less than 1%)  
3 conversions or losses to tidal perennial aquatic community in the study area. These losses or  
4 conversions (76 acres of permanent and 149 acres of temporary loss) would be largely associated  
5 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish  
6 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions  
7 would occur through the course of the BDCP restoration program at various tidal restoration sites  
8 throughout the study area. By the end of the Plan timeframe, a total of more than 27,000 acres of  
9 high-value tidal perennial aquatic natural community would be restored (estimated from Table 5 in  
10 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a  
11 wide region of the study area, including within the Suisun Marsh, Cosumnes/ Mokelumne, Cache  
12 Slough, and South Delta ROAs (see Figure 12-1).

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

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Alternative 1A would result in the loss or conversion of approximately 211 acres of tidal perennial  
22 aquatic natural community due to construction of the water conveyance facilities (CM1) and fish  
23 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The  
24 construction losses would be primarily along the Sacramento River at intake sites and within the  
25 northern section of the Yolo Bypass, while inundation conversions would be at various tidal  
26 restoration sites throughout the study area. The losses and conversions would be spread across the  
27 10-year near-term timeframe. These losses and conversions would be offset by planned restoration  
28 of an estimated 3,400 acres of high-value tidal perennial aquatic natural community scheduled for  
29 the first 10 years of Alternative 1A implementation (CM4). AMM1, AMM2, AMM6, AMM7, and  
30 AMM10 would also be implemented to minimize impacts. Because of these offsetting near-term  
31 restoration activities and AMMs, impacts would be less than significant. Typical project-level  
32 mitigation ratios (1:1 for restoration) would indicate that 211 acres of restoration would be needed  
33 to offset (i.e., mitigate) the 211 acres of loss or conversion. The restoration would be initiated at the  
34 beginning of Plan implementation to minimize any time lag in the availability of this habitat to  
35 special-status species, and would result in a net gain in acreage of this sensitive natural community.

36 **Late Long-Term Timeframe**

37 At the end of the Plan period, 225 acres of the natural community would be lost or converted and an  
38 estimated 27,000 acres of this community would be restored. There would be no net permanent  
39 reduction in the acreage of this sensitive natural community within the study area. Therefore,  
40 Alternative 1A would not have a substantial adverse effect on this natural community; the impact  
41 would be beneficial.

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

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

- 9
- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A  
11 would result in an increase in the frequency, magnitude and duration of inundation-related  
12 changes in water depth and velocity of 9–36 acres of tidal perennial aquatic natural community.  
13 The methods used to estimate these inundation acreages are described in BDCP Appendix 5.J,  
14 *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by  
15 inundation would vary with the flow volume that would pass through the newly constructed  
16 notch in the Fremont Weir. The 9-acre increase in inundation would be associated with a notch  
17 flow of 1,000 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-  
18 related increases in flow through Fremont Weir would be expected in 30% of the years. Most of  
19 the tidal perennial aquatic community occurs in the southern section of the bypass on Liberty  
20 Island, and, to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe  
21 Drain. The anticipated change in management of flows in the Yolo Bypass includes more  
22 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some  
23 years, later releases into the bypass in spring months (April and May). The modification of  
24 periodic inundation events would be expected to be beneficial to the ecological function of tidal  
25 perennial aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo  
26 Bypass waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-  
27 2 and described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in  
28 the bypass would not substantially modify its value for special-status or common terrestrial  
29 species. Water depths and water flow rates would increase over Existing Conditions and the No  
30 Action condition in approximately 30% of the years, but it would not fragment the habitat or  
31 make it less accessible to special-status or common terrestrial species. The modifications would  
32 not result in a loss of this community. The plant species associated with this community are  
33 adapted to inundation. The extended inundation would be designed to expand foraging and  
34 spawning habitat for Delta fishes. The effects of these changes in the inundation regime on  
35 terrestrial species that rely on tidal perennial aquatic habitats are discussed in detail later in this  
36 chapter, under the individual species assessments.
  - 37 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a  
38 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic  
39 habitat. Specific locations for this restoration activity have not been identified, but they would  
40 likely be focused in the south Delta area, along the major rivers and Delta channels. The more  
41 frequent exposure of these wetlands to stream flooding events would be beneficial to the  
42 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target  
43 aquatic species. The plant species associated with these tidal perennial aquatic areas are  
adapted to inundation and would not be substantially modified.

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

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

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

### 16 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 17 **Operation, Maintenance and Management Activities**

18 Once the physical facilities associated with BDCP Alternative 1A are constructed and the stream flow  
19 regime associated with changed water management is in effect, there would be new ongoing and  
20 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
21 conservation lands that could affect tidal perennial aquatic natural community in the study area. The  
22 ongoing actions include the diversion of Sacramento River flows in the north Delta, and reduced  
23 diversions from south Delta channels. These actions are associated with CM1 (see Impact BIO-2 for  
24 effects associated with CM2). The periodic actions would involve access road and conveyance facility  
25 repair, vegetation management at the various water conveyance facilities and habitat restoration  
26 sites (CM13), levee repair and replacement of levee armoring, channel dredging, and habitat  
27 enhancement in accordance with natural community management plans. The potential effects of  
28 these actions are described below.

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

42 The periodic changes in flows in the Sacramento River, Feather River, and American River  
43 associated with Alternative 1A operations would affect salinity, water temperature, dissolved  
44 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta

1 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially  
2 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun  
3 Marsh as a result of increased export of Sacramento River water. These salinity changes are not  
4 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic  
5 natural community for terrestrial species in the study area.

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

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

- 43 • *Channel dredging.* Long-term operation of the Alternative 1A intakes on the Sacramento River  
44 would include periodic dredging of sediments that might accumulate in front of intake screens.  
45 The dredging would occur in tidal perennial aquatic natural community and would result in  
46 short-term increases in turbidity and disturbance of the substrate. These conditions would not



1 eliminate the community, but would diminish its value for special-status and common species  
2 that rely on it for movement corridor or foraging area. The individual species effects are  
3 discussed later in this chapter.

- 4 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
5 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a  
6 management plan would be prepared that specifies actions to improve the value of the habitats  
7 for covered species. Actions would include control of invasive nonnative plant and animal  
8 species, restrictions on vector control and application of herbicides, and maintenance of  
9 infrastructure that would allow for movement through the community. The enhancement efforts  
10 would improve the long-term value of this community for both special-status and common  
11 species.

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

24 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net  
25 permanent reduction in this sensitive natural community within the study area. Therefore, there  
26 would be no adverse effect on the community.

27 **CEQA Conclusion:**

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

1 **Tidal Brackish Emergent Wetland**

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

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

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

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

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

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

3

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

6 Construction and operation of the Alternative 1A water conveyance facilities (CM1) would not affect  
7 tidal brackish emergent wetland natural community. Restoration of tidal marsh habitats associated  
8 with CM4 would require site preparation, earthwork, and other site activities that could remove  
9 tidal brackish emergent wetland. Levee modifications, grading or contouring, filling to compensate  
10 for land subsidence, and creation of new channels could also result in the removal of tidal brackish  
11 emergent wetland. All of this construction and land modification activity that could affect tidal  
12 brackish emergent wetland would occur in Suisun Marsh (CZ 11). The acreage of loss has not been  
13 calculated because the specific locations for site preparation and earthwork have not been  
14 identified, but the loss would likely be very small (less than 1 acre). These activities would occur in  
15 small increments through the course of the BDCP restoration program. The protection and  
16 restoration elements of CM4 would greatly exceed any of the short-term losses described above. At  
17 least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area (BDCP  
18 Objective TBEWNC1.1 associated with CM4), with 2,000 acres of restoration occurring in the near-  
19 term timeframe (Table 12-1A-2). In addition, the habitat and ecosystem functions of BDCP restored  
20 tidal brackish emergent wetland would be maintained and enhanced (CM11). The BDCP beneficial  
21 effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.3.2) states that at least 6,000 acres of  
22 tidal brackish emergent wetland community would be restored in CZ 11, and that tidal natural  
23 communities restoration would decrease habitat fragmentation by providing additional connectivity  
24 between isolated patches of tidal brackish emergent wetland. This restoration would also occur  
25 under Alternative 1A.

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

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

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

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

35 Once the physical facilities associated with CM1 and CM4 of BDCP Alternative 1A are constructed  
36 and the water management practices associated with changed reservoir operations, diversions from  
37 the north Delta, and marsh restoration are in effect, there would be new ongoing and periodic  
38 actions that could affect tidal brackish emergent wetland natural community in the study area. The  
39 ongoing actions would involve water releases and diversions, access road and levee repair,  
40 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with  
41 natural community management plans. The potential effects of these actions are described below.

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

1 channels (associated with Operational Scenario A) would not result in the permanent reduction  
2 in acreage of tidal brackish emergent wetland natural community in the study area. Flow levels  
3 in the upstream rivers would not directly affect this natural community because it does not exist  
4 upstream of the Delta. Increased diversions of Sacramento River flows in the north Delta would  
5 not result in a permanent reduction in tidal brackish emergent wetland downstream of these  
6 diversions. Salinity levels in Suisun Marsh channels would be expected to increase with reduced  
7 Sacramento River outflows (see Chapter 8, Section 8.3.3.9), but this change would not be  
8 sufficient to change the acreage of brackish marsh. This natural community persists in an  
9 environment that experiences natural fluctuations in salinity due to tidal ebb and flow. Reduced  
10 diversions from the south Delta channels would not create a reduction in this natural  
11 community.

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

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

- 43 ● *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP  
44 actions has the potential to require removal of adjacent vegetation and could entail earth and  
45 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil  
46 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal

1 erosion, turbidity and runoff control management practices, including those developed as part  
2 of AMM2 Construction Best Management Practices and Monitoring and AMM4 Erosion and  
3 Sediment Control Plan. Any vegetation removal or earthwork adjacent to or within aquatic  
4 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation  
5 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
6 adverse effects on this community.

- 7 • *Vegetation management.* Vegetation management in the form of physical removal and chemical  
8 treatment (CM11) would be a periodic activity associated with the long-term maintenance of  
9 restoration sites. Use of herbicides to control nuisance vegetation could pose a long-term hazard  
10 to tidal brackish emergent wetland natural community at or adjacent to treated areas. The  
11 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
12 stormwater onto the natural community, or direct discharge of herbicides to wetland areas  
13 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
14 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
15 hazards to humans and the environment from use of various chemicals during maintenance  
16 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
17 including the commitment to prepare and implement spill prevention, containment, and  
18 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
19 including control of drift and runoff from treated areas, and use of herbicides approved for use  
20 in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
21 levees associated with tidal wetland restoration activities.
- 22 • *Channel dredging.* Long-term maintenance of tidal channels that support wetland expansion in  
23 Suisun Marsh would include periodic dredging of sediments. The dredging would take place  
24 adjacent to tidal brackish emergent wetland natural community and would result in short-term  
25 increases in turbidity and disturbance of the substrate. These conditions would not eliminate  
26 the community, but would diminish its value in the short term for special-status and common  
27 species that rely on it for cover, movement corridor or foraging area. The individual species  
28 effects are discussed later in this chapter.
- 29 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
30 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural  
31 community, a management plan would be prepared that specifies actions to improve the value  
32 of the habitats for covered species. Actions would include control of invasive nonnative plant  
33 and animal species, fire management, restrictions on vector control and application of  
34 herbicides, and maintenance of infrastructure that would allow for movement through the  
35 community. The enhancement efforts would improve the long-term value of this community for  
36 both special-status and common species.

37 The various operations and maintenance activities described above could alter acreage and value of  
38 tidal brackish emergent wetland natural community in the study area through water operations,  
39 levee and road maintenance, channel dredging and vegetation management in or adjacent to this  
40 community. Activities could also introduce sediment and herbicides that would reduce the value of  
41 this community to common and sensitive plant and wildlife species. Other periodic activities  
42 associated with the Plan, including management, protection and enhancement actions associated  
43 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
44 *Enhancement and Management*, would be undertaken to enhance the value of the community. While  
45 some of these activities could result in small changes in acreage, these changes would be greatly  
46 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The

1 management actions associated with levee repair, periodic dredging and control of invasive plant  
2 species would also result in a long-term benefit to the species associated with tidal brackish  
3 emergent wetland habitats by improving water movement. Ongoing operation, maintenance and  
4 management activities would not result in a net permanent reduction in this sensitive natural  
5 community within the study area.

6 **NEPA Effects:** There would be no adverse effect on the tidal brackish emergent wetland natural  
7 community.

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

#### 21 **Tidal Freshwater Emergent Wetland**

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

- 29 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
30 accommodate sea level rise (Objective L1.3 associated with CM4)
- 31 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient  
32 transitional uplands along the fringes of restored brackish and freshwater tidal emergent  
33 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future  
34 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with  
35 CM4)
- 36 ● Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of  
37 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6 and/or 7 (Objective  
38 TFEWNC1.1, associated with CM4)
- 39 ● Restore tidal freshwater emergent wetlands in areas that increase connectivity among  
40 conservation lands (Objective TFEWNC1.2, associated with CM4)
- 41 ● Restore and sustain a diversity of marsh vegetation that reflects historical species compositions  
42 and high structural complexity (Objective TFEWNC2.1, associated with CM4)

- 1 • Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide  
2 variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2,  
3 associated with CM4)

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

9 **Table 12-1A-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated**  
10 **with Alternative 1A (acres)a**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	6	6	6	6	0	0
CM2	6	6	0	0	24-58	0
CM4	1	1	0	0	0	0
CM5	0	1	0	1	0	3
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>13</b>	<b>14</b>	<b>6</b>	<b>7</b>	<b>24-58</b>	<b>3</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

11

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

14 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
15 CM4, CM5, and CM6 would permanently eliminate an estimated 14 acres and temporarily remove 7  
16 acres of tidal freshwater emergent wetland natural community in the study area. These  
17 modifications represent less than 1% of the 8,856 acres of the community that is mapped in the  
18 study area. The majority of the permanent and temporary losses would happen during the first 10  
19 years of Alternative 1A implementation, as water conveyance facilities are constructed and habitat  
20 restoration is initiated. Natural communities restoration would add at least 24,000 acres of tidal  
21 freshwater emergent wetland natural community during the course of Plan restoration activities,  
22 which would expand the area of that habitat and offset the losses. The BDCP beneficial effects  
23 evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the implementation of *CM4*  
24 *Tidal Natural Communities Restoration* would restore at least 24,000 acres of tidal freshwater



1 emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the  
2 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South  
3 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan  
4 would promote vegetation diversity and structural complexity (as incorporated into the restoration  
5 design) in restored tidal freshwater marsh. The same restoration actions would be undertaken as  
6 part of Alternative 1A.

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

- 10 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance  
11 facilities would permanently remove 6 acres and temporarily remove 6 acres of tidal freshwater  
12 emergent wetland community. Most of the loss associated with intake construction would be in  
13 the vicinity of Hood, just south of the Hood Franklin Road, and along rivers and canals in the  
14 central Delta as a result of barge unloading facility construction (Middle River on the east side of  
15 Bacon Island and the North Victoria Canal at the north end of Victoria Island; see Terrestrial  
16 Biology Mapbook). These losses would take place during the near-term construction period.

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

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

- 32 • *CM4 Tidal Natural Communities Restoration*: Based on hypothetical footprints of this restoration  
33 activity, initial land grading and levee modification could permanently remove up 1 acre of tidal  
34 freshwater emergent wetland natural community. This loss would occur during the near-term  
35 timeframe throughout the ROAs identified for tidal wetland restoration. At the same time, an  
36 estimated 24,000 acres of tidal freshwater emergent wetland community would be restored  
37 during tidal habitat restoration, consistent with Objective TFEWNC1.1 (associated with CM4).  
38 Approximately 8,850 acres of the restoration would happen during the first 10 years of  
39 Alternative 1A implementation, which would coincide with the timeframe of water conveyance  
40 facilities construction. The remaining restoration would be spread over the following 30 years.  
41 Tidal wetland communities restoration is expected to be focused in the ROAs identified in Figure  
42 12-1. Restoration would be located and designed to improve habitat connectivity (Objective  
43 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in  
44 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would happen in the

1 lower Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,  
2 Cosumnes/Mokelumne and West Delta ROAs.

3 The restoration activities associated with CM4 in the Plan Area ROAs would result in other  
4 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances  
5 associated with levee breaching and grading or contouring would increase opportunities for the  
6 introduction or spread of invasive species. Implementation of CM11 would limit this risk  
7 through invasive species control and wetland management and enhancement activities to  
8 support native species. Flooding of dry areas for tidal freshwater marsh creation could also  
9 increase the bioavailability of methylmercury, especially in the Cache Slough,  
10 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the  
11 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty  
12 in assessing this risk at a programmatic level, it will need to be considered at a project level.  
13 Site-specific restoration plans that address the creation and mobilization of mercury, and  
14 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
15 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water  
16 temperature fluctuations in newly created marsh is also an issue of concern that is difficult to  
17 quantify at the current stage of restoration design. None of these effects is expected to limit the  
18 extent or value of tidal freshwater emergent wetland in the study area.

- 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
20 would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater emergent  
21 wetland habitat. The construction-related losses would be considered a permanent removal of  
22 the habitats directly affected. The majority of seasonally inundated floodplain restoration is  
23 expected to be implemented along the lower San Joaquin River in the south and central Delta  
24 areas. Floodplain restoration along the San Joaquin River would improve connectivity for a  
25 variety of species that rely on freshwater marsh and riparian habitats. The regional and Plan  
26 Area landscape linkages along the San Joaquin River are included in Figure 12-2. This activity is  
27 scheduled to start following construction of water conveyance facilities, which is expected to  
28 take 10 years.
- 29 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
30 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and  
31 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
32 enhancement activity would take place on narrow strips of habitat, including levees and channel  
33 banks. The improvements would occur within the study area on sections of the Sacramento, San  
34 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

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

### 38 ***Near-Term Timeframe***

39 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
40 affect the tidal freshwater emergent wetland natural community through CM1 construction losses  
41 (6 acres permanent and 6 acres temporary), CM2 construction losses (6 acres permanent), and CM4  
42 construction losses (1 acre permanent). The tidal freshwater emergent wetland natural community  
43 would be lost in the north Delta near Hood, in the central Delta on the fringes of Bacon and Victoria  
44 Islands, and at various locations within the Yolo Bypass and the tidal restoration ROAs.

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

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

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

18 Implementation of Alternative 1A as a whole would result in relatively minor (less than 1%) losses  
19 of tidal freshwater emergent wetland community in the study area. These losses (16 acres of  
20 permanent and 7 acres of temporary loss) would be largely associated with construction of the  
21 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee  
22 modification and land grading for tidal marsh restoration (CM4) and floodplain restoration (CM5).  
23 The CM4 and CM5 losses would occur during the course of conservation actions at various tidal and  
24 floodplain restoration sites throughout the study area. By the end of the Plan timeframe, a total of  
25 24,000 acres of this natural community would be restored over a wide region of the study area,  
26 including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see  
27 Figure 12-1).

28 **NEPA Effects:** The creation of 8,850 acres of tidal freshwater emergent wetland natural community  
29 as part of CM4 during the first 10 years of BDCP implementation would more than offset the  
30 construction and inundation-related effects of implementing CM1, CM2, CM4 and CM5, avoiding any  
31 adverse effect in the near-term. Because of the 24,000 acres of tidal freshwater emergent wetland  
32 restoration that would occur over the course of the Plan, Alternative 1A would not result in a net  
33 long-term reduction in the acreage of a sensitive natural community; the effect would be beneficial.

### 34 **CEQA Conclusion:**

#### 35 **Near-Term Timeframe**

36 Alternative 1A would result in the loss of approximately 19 acres of tidal freshwater emergent  
37 wetland natural community due to construction of the water conveyance facilities (CM1) and fish  
38 passage improvements (CM2), and tidal marsh restoration (CM4). The construction losses would  
39 occur in both the north Delta near Hood and in the central Delta on the fringes of Bacon and  
40 Woodward Islands. The losses would be spread across a 10-year near-term timeframe and would be  
41 offset by planned restoration of 8,850 acres of tidal freshwater emergent wetland natural  
42 community scheduled for the first 10 years of Alternative 1A implementation (CM4). AMM1, AMM2,  
43 AMM6, AMM7, and AMM10 would also be implemented to minimize impacts. Because of these

1 offsetting near-term restoration activities and AMMs, impacts would be less than significant. Typical  
2 project-level mitigation ratios (1:1 for restoration) would indicate that 19 acres of restoration would  
3 be needed to offset (i.e., mitigate) the 19 acres of loss. The restoration would be initiated at the  
4 beginning of Plan implementation to minimize any time lag in the availability of this habitat to  
5 special-status species, and would result in a net gain in acreage of this sensitive natural community.

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

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

### 12 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 13 **Freshwater Emergent Wetland Natural Community**

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

- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A  
22 would result in an increase in the frequency, magnitude and duration of inundation of 24–58  
23 acres of tidal freshwater emergent wetland natural community. The methods used to estimate  
24 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
25 *Wildlife, and Plants*. The area more frequently inundated would vary with the flow volume that  
26 would pass through the newly constructed notch in the Fremont Weir. The 24-acre increase in  
27 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the  
28 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
29 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in  
30 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic  
31 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate  
32 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent  
33 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,  
34 later releases into the bypass in spring months (April and May). The modification of periodic  
35 inundation events would not adversely affect the ecological function of tidal freshwater  
36 emergent wetland habitats and would not substantially modify its value for special-status or  
37 common terrestrial species. The plants in this natural community are adapted to periodic  
38 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant  
39 species are described in detail in later sections of this chapter.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a  
41 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater  
42 emergent wetland habitats. Specific locations for this restoration activity have not been  
43 identified, but they would likely be focused along the major rivers and Delta channels in the  
44 south Delta. The reconnection of these wetlands to stream flooding events would be beneficial to

1 the wetlands' ecological function, especially as they relate to the BDCP's target terrestrial and  
2 aquatic species. Foraging activity and refuge sites would be expanded into areas currently  
3 unavailable or infrequently available to some aquatic species.

4 In summary, 27-61 acres of tidal freshwater emergent wetland natural community in the study area  
5 would be subjected to more frequent inundation from flood flows as a result of implementing two  
6 Alternative 1A conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural  
7 community is a habitat of great value to both terrestrial and aquatic species in the study area.

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

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

#### 17 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 18 **Ongoing Operation, Maintenance and Management Activities**

19 Once the physical facilities associated with BDCP Alternative 1A are constructed and the stream flow  
20 regime associated with changed water management is in effect, there would be new ongoing and  
21 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
22 conservation lands that could affect tidal freshwater emergent wetland natural community in the  
23 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,  
24 and reduced diversions from south Delta channels. These actions are associated with CM1 (see  
25 Impact BIO-7 for effects associated with CM2). The periodic actions would involve access road and  
26 conveyance facilities repair, vegetation management at the various water conveyance facilities and  
27 habitat restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging,  
28 and habitat enhancement in accordance with natural community management plans. The potential  
29 effects of these actions are described below.

- 30 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
31 *Delta channels.* Reduced diversions from the south Delta channels would not create a reduction  
32 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows  
33 in the Sacramento River, Feather River, and American River associated with modified reservoir  
34 operations (Operational Scenario A), and the increased diversion of Sacramento River flows at  
35 north Delta intakes associated with Alternative 1A would affect salinity, water temperature,  
36 dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in these rivers and  
37 Delta waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially  
38 substantial increases in electrical conductivity (salinity) are predicted for the west Delta and  
39 Suisun Marsh as a result of these changed water operations. These salinity changes may alter the  
40 plant composition of tidal freshwater emergent wetland along the lower Sacramento and San  
41 Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes would  
42 be complicated by anticipated sea level rise and the effects of downstream tidal restoration over  
43 the life of the Plan. There is the potential that some tidal freshwater marsh may become

1 brackish. These potential changes are not expected to result in a significant reduction in the  
2 acreage and value of tidal freshwater emergent wetland natural community in the study area.

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

18 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on  
19 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh  
20 vegetation allows the emergent plants to maintain an appropriate water depth as water levels  
21 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP  
22 proponents have incorporated an environmental commitment (see Appendix 3B, Section  
23 3B.1.19, *Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged Material*) into the  
24 project that would lessen this potential effect. The Sacramento River water diverted at north  
25 Delta intakes would pass through sedimentation basins before being pumped to water  
26 conveyance structures. The commitment states that sediment collected in these basins would be  
27 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of  
28 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,  
29 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for  
30 marsh restoration would remain available for marsh accretion. With this commitment to reuse  
31 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net  
32 reduction in the acreage and value of this special-status marsh community. The effect would not  
33 be adverse (NEPA) and would be less than significant (CEQA).

- 34 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
35 conveyance facilities and levees associated with the BDCP actions have the potential to require  
36 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal  
37 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,  
38 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal  
39 erosion, turbidity and runoff control management practices, including those developed as part  
40 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
41 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent  
42 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and  
43 revegetation of disturbed surfaces. Proper implementation of these measures would avoid  
44 permanent adverse effects on this community.
- 45 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
46 treatment, would be a periodic activity associated with the long-term maintenance of water

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

- 15 • *Channel dredging.* Long-term operation of the Alternative 1A intakes on the Sacramento River  
16 would include periodic dredging of sediments that might accumulate in front of intake screens.  
17 The dredging would be done in waterways adjacent to tidal freshwater emergent wetlands and  
18 would result in short-term increases in turbidity and disturbance of the substrate. These  
19 conditions would not eliminate the community, but would diminish its value for special-status  
20 and common species that rely on it for cover or foraging area. The individual species effects are  
21 discussed later in this chapter.
- 22 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
23 communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a  
24 management plan would be prepared that specifies actions to improve the value of the habitats  
25 for covered species. Actions would include control of invasive nonnative plant and animal  
26 species, fire management, restrictions on vector control and application of herbicides, and  
27 maintenance of infrastructure that would allow for movement through the community. The  
28 enhancement efforts would improve the long-term value of this community for both special-  
29 status and common species.

30 The various operations and maintenance activities described above could alter acreage of tidal  
31 freshwater emergent wetland natural community in the study area through changes in flow patterns  
32 and resultant changes in water quality. Activities could also introduce sediment and herbicides that  
33 would reduce the value of this community to common and sensitive plant and wildlife species. Other  
34 periodic activities associated with the Plan, including management, protection and enhancement  
35 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
36 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
37 community. While some of these activities could result in small changes in acreage, these changes  
38 would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*  
39 *Restoration*. The management actions associated with levee repair, periodic dredging and control of  
40 invasive plant species would also result in a long-term benefit to the species associated with tidal  
41 freshwater emergent wetland habitats by improving water movement.

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

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

### 15 **Valley/Foothill Riparian**

16 Construction, operation, maintenance and management associated with the conservation  
17 components of Alternative 1A would have no long-term adverse effects on the habitats associated  
18 with the valley/foothill riparian natural community. Initial development and construction of CM1,  
19 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this  
20 community (see Table 12-1A-4). Full implementation of Alternative 1A would also include the  
21 following conservation actions over the term of the BDCP to benefit the valley/foothill riparian  
22 natural community.

- 23 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
24 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
25 with CM7)
- 26 ● Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7  
27 by year 10 (Objective VFRNC1.2, associated with CM3)
- 28 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
29 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
30 with CM5 and CM7)
- 31 ● Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,  
32 associated with CM3 and CM7)
- 33 ● Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-  
34 to late-successional riparian vegetation (VFRNC2.2,) in large blocks with a minimum patch size  
35 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and CM7)
- 36 ● Maintain or increase abundance and distribution of valley/foothill riparian natural community  
37 vegetation alliances that are rare or uncommon as recognized by California Department of Fish  
38 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance  
39 (Objective VFRNC3.1)

40 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
41 3.3 that would improve the value of valley/foothill riparian natural community for terrestrial  
42 species. As explained below, with the restoration and enhancement of these amounts of habitat, in



1 addition to implementation of AMMs, impacts on this natural community would not be adverse for  
2 NEPA purposes and would be less than significant for CEQA purposes.

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	58	58	28	28	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>445</b>	<b>742</b>	<b>116</b>	<b>151</b>	<b>51-92</b>	<b>266</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

5

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

8 Construction, land grading and habitat restoration activities that would accompany the  
9 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 742  
10 acres and temporarily remove 151 acres of valley/foothill riparian natural community in the study  
11 area. These modifications represent less than 5% of the 17,966 acres of the community that is  
12 mapped in the study area. The majority of the permanent and temporary losses would happen  
13 during the first 10 years of Alternative 1A implementation, as water conveyance facilities are  
14 constructed and habitat restoration is initiated. Valley/foothill riparian protection (750 acres) and  
15 restoration (800 acres) would be initiated during the same period, which would begin to offset the  
16 losses, thereby making them not adverse under NEPA and less than significant under CEQA. By the  
17 end of the Plan period, 5,000 acres of this natural community would be restored. The BDCP  
18 beneficial effects analysis (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of  
19 Alternative 4 would restore or create 5,000 acres of riparian forest and scrub in Conservation Zones  
20 1, 2, 4, 5, 6, and 7, with at least 3,000 acres occurring on restored seasonally inundated floodplain.  
21 Alternative 4 would also protect 750 acres of existing valley/foothill riparian natural community in  
22 Conservation Zone 7. These same conservation actions would occur with implementation of  
23 Alternative 1A.

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

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance  
5 facilities would permanently remove 58 acres and temporarily remove 28 acres of  
6 valley/foothill riparian natural community. Most of the permanent loss would be where Intakes  
7 1–5 encroach on the Sacramento River’s east bank between Freeport and Courtland. The  
8 riparian areas here are very small patches, some dominated by valley oak and others by  
9 nonnative trees and scrub vegetation (see Terrestrial Biology Mapbook). Smaller areas  
10 dominated by blackberry would be eliminated at the forebay site adjacent to Clifton Court  
11 Forebay. There would be temporary losses where pipelines cross Snodgrass Slough and other  
12 small waterways east of the Sacramento River, and where temporary work areas surround  
13 intake sites. The riparian habitat in these areas is also composed of very small patches or  
14 stringers of valley oak and scrub bordering waterways. These losses would take place during the  
15 near-term construction period.
- 16 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
17 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
18 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
19 Sacramento Weir improvements. All of these activities could involve excavation and grading in  
20 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on  
21 hypothetical construction footprints, a total of 89 acres could be permanently lost and another  
22 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end  
23 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of  
24 valley oak, cottonwood, sycamore and willow trees. The riparian areas here are primarily small,  
25 disconnected patches with moderate to low value as wildlife movement corridors. Most of these  
26 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and  
27 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would  
28 occur primarily in the near-term timeframe.
- 29 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
30 footprints, implementation of CM4 would permanently inundate or remove 552 acres of  
31 valley/foothill riparian community. The losses would be spread among most of the ROAs  
32 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh  
33 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,  
34 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation  
35 dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP  
36 Chapter 5, Section 5.4.5.1.1). The actual loss of riparian habitat to marsh restoration would be  
37 expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration  
38 projects were identified and planned, sites could be selected that avoid riparian areas as much  
39 as possible.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
41 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill  
42 riparian natural community. The construction-related losses would be considered a permanent  
43 removal of the habitats directly affected. These losses would be expected to occur along the San  
44 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to  
45 start following construction of water conveyance facilities, which is expected to take 10 years.

- 1 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
2 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
3 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
4 activity would occur along waterway margins where riparian habitat stringers exist, including  
5 levees and channel banks. The improvements would occur within the study area on sections of  
6 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 7 • *CM7 Riparian Natural Community Restoration*: The valley/foothill riparian natural community  
8 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)  
9 restoration and channel margin enhancements. Following community-specific goals and  
10 objectives in the Plan, a total of 5,000 acres of this community would be restored (Objective  
11 VFRNC1.1) and 750 acres would be protected (Objective VFRNC1.2) over the life of the Plan.  
12 Approximately 800 acres would be restored and the entire 750 acres would be protected during  
13 the first 10 years of Alternative 1A implementation. Riparian restoration and protection would  
14 be focused in CZs 4 and 7 (Objective VFRNC2.3), with a goal of adding a 500-acre portion of the  
15 restoration in one or the other of these zones. A variety of successional stages would also be  
16 sought to benefit the variety of sensitive plant and animal species that rely on this natural  
17 community in the study area (Objective VFRNC2.4).

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

### 21 ***Near-Term Timeframe***

22 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
23 affect the valley/foothill riparian natural community through CM1 construction losses (58 acres  
24 permanent and 28 acres temporary) and the CM2 construction losses (89 acres permanent and 88  
25 acres temporary). The natural community would be lost primarily along the eastern bank of the  
26 Sacramento River at intake sites, along pipeline routes connecting these intakes to the forebay, and  
27 in the northern Yolo Bypass. Approximately 298 acres of the inundation and construction-related  
28 loss from CM4 would occur during the near-term throughout the ROAs mapped in Figure 12-1.

29 The construction losses of this special-status natural community would represent an adverse effect  
30 if they were not offset by avoidance and minimization measures and protection/restoration actions  
31 associated with BDCP conservation components. Loss of valley/foothill riparian natural community  
32 would be considered a loss in acreage of a sensitive natural community, and could be considered a  
33 loss of wetlands as defined by Section 404 of the CWA. As indicated above, most of the losses would  
34 be in small patches or narrow strips along waterways with limited structural complexity. However,  
35 the restoration of 800 acres and protection (including significant enhancement) of 750 acres of  
36 valley/foothill riparian natural community as part of CM7 and CM3 during the first 10 years of  
37 Alternative 1A implementation would minimize this near-term loss, avoiding an adverse effect. At  
38 least 400 acres of the protection is planned for the first 5 years of Alternative 1A implementation.  
39 The restoration areas would be large areas providing connectivity with existing riparian habitats  
40 and would include a variety of trees and shrubs to produce structural complexity. Typical project-  
41 level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 561 acres of  
42 protection and 561 acres of restoration would be needed to offset (i.e., mitigate) the 561 acres of  
43 loss (the combination of permanent and temporary losses in the near-term listed in Table 12-1A-4).

1 The combination of the two approaches (protection and restoration) are designed to avoid a  
2 temporal lag in the value of riparian habitat available to sensitive species.

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

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

10 Implementation of Alternative 1A as a whole would result in approximately 5% losses of  
11 valley/foothill riparian community in the study area. These losses (742 acres of permanent and 151  
12 acres of temporary loss) would be largely associated with construction of the water conveyance  
13 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal  
14 marsh restoration (CM4), and setback of levees during floodplain expansion (CM5). Inundation  
15 losses would occur during the course of Plan restoration activities at various tidal restoration sites  
16 throughout the study area. By the end of the Plan timeframe, a total of 5,000 acres of this natural  
17 community would be restored and 750 acres would be protected (CM7 and CM3, respectively). The  
18 restoration would occur primarily in CZs 4 and 7, in the Cosumnes/ Mokelumne and South Delta  
19 ROAs (see Figure 12-1).

20 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of  
21 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10  
22 years of BDCP implementation would minimize the near-term loss of this community, avoiding any  
23 adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and protection of 750  
24 acres of valley/foothill riparian natural community during the course of the Plan, Alternative 1A  
25 would not result in a net long-term reduction in the acreage of a sensitive natural community; the  
26 effect would be beneficial.

### 27 **CEQA Conclusion:**

#### 28 **Near-Term Timeframe**

29 Alternative 1A would result in the loss of approximately 561 acres of valley/foothill riparian natural  
30 community due to construction of the water conveyance facilities (CM1) and fish passage  
31 improvements (CM2), and inundation during tidal marsh restoration (CM4). The natural community  
32 would be lost primarily along the Sacramento River at intake sites, along pipeline routes connecting  
33 these intakes to the forebay, and within the northern section of the Yolo Bypass, while inundation  
34 losses would occur at various tidal restoration sites throughout the study area. The construction  
35 losses would be spread across a 10-year near-term timeframe. These losses would be minimized by  
36 planned restoration of 800 acres (CM7) and protection (including significant enhancement) of 750  
37 acres (CM3) of valley/foothill riparian natural community scheduled for the first 10 years of  
38 Alternative 1A implementation. At least 400 acres of the protection is planned for the first 5 years of  
39 Alternative 1A implementation. AMM1, AMM2, AMM6, AMM7, AMM10, and AMM18 would also be  
40 implemented to minimize impacts. Because of these near-term restoration and protection activities  
41 and AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for  
42 protection and 1:1 for restoration) would indicate that 561 acres of protection and 561 acres of  
43 restoration would be needed to offset (i.e., mitigate) the 561 acres of loss. The combination of the

1 two approaches (protection and restoration) are designed to avoid a temporal lag in the value of  
2 riparian habitat available to sensitive species. The restoration would be initiated at the beginning of  
3 Alternative 1A implementation to minimize any time lag in the availability of this habitat to special-  
4 status species, and would result in a net gain in acreage of this sensitive natural community.

#### 5 ***Late Long-Term Timeframe***

6 At the end of the Plan period, 893 acres of valley/foothill riparian natural community would be  
7 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and  
8 750 acres would be protected. There would be no net permanent reduction in the acreage of this  
9 sensitive natural community within the study area. Therefore, Alternative 1A would not have a  
10 substantial adverse effect on this natural community; the impact on the valley/foothill riparian  
11 natural community would be beneficial.

#### 12 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 13 **Valley/Foothill Riparian Natural Community**

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

- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A  
21 would result in an increase in the frequency, magnitude and duration of inundation of 51–92  
22 acres of valley/foothill riparian natural community. The area more frequently inundated would  
23 vary with the flows passed through the newly constructed notch in the Fremont Weir. The 51  
24 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by a notch  
25 flow of 4,000 cfs. The methods used to estimate these inundation acreages are described in  
26 BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. These increased flow  
27 conditions would be expected to occur in no more than 30% of all years (see BDCP Chapter 5,  
28 Section 5.4.1.2). The valley/foothill riparian community occurs throughout the bypass, including  
29 a large acreage just below Fremont Weir in the north end of the bypass. There are other riparian  
30 habitat areas on Liberty Island, and, to a lesser extent, along the eastern and western edges of  
31 the bypass, including along the Tule Canal/Toe Drain, the west side channels and the  
32 Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass includes  
33 more frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in  
34 some years, later releases into the bypass in spring months (April and May). The modification of  
35 periodic inundation events would not adversely affect riparian habitats, as they have persisted  
36 under similar high flows and extended inundation periods in the Yolo Bypass. The effects of this  
37 inundation on wildlife and plant species are described in detail in later sections of this chapter.
- 38 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
39 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian  
40 habitats. Specific locations for this restoration activity have not been identified, but they would  
41 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see  
42 Figure 12-1). The reconnection of riparian vegetation to periodic stream flooding events would  
43 be beneficial to the ecological function of this natural community, especially in the germination  
44 and establishment of native riparian plants as flood scour increases.

1 In summary, from 317 to 368 acres of valley/foothill riparian community in the study area would be  
2 subjected to more frequent inundations a result of implementing two Alternative 1A conservation  
3 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits  
4 from periodic inundation; therefore, periodic inundation would not result in a net permanent  
5 reduction in the acreage of this community in the study area. The increased inundation could create  
6 a beneficial effect on the community as it relates to germination and establishment of native riparian  
7 plants.

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

10 **CEQA Conclusion:** An estimated 316 to 367 acres of valley/foothill riparian community in the study  
11 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5  
12 under Alternative 1A. The valley/foothill riparian community is conditioned to and benefits from  
13 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in  
14 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill  
15 riparian natural community in the Yolo Bypass and along south Delta waterways would have a  
16 beneficial impact on the community.

#### 17 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 18 **Operation, Maintenance and Management Activities**

19 Once the physical facilities associated with BDCP Alternative 1A are constructed and the stream flow  
20 regime associated with changed water management is in effect, there would be new ongoing and  
21 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
22 conservation lands that could affect valley/foothill riparian natural community in the study area.  
23 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
24 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of  
25 reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-10 for effects  
26 associated with CM2). The periodic actions would involve access road and conveyance facility  
27 repair, vegetation management at the various water conveyance facilities and habitat restoration  
28 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
29 enhancement in accordance with natural community management plans. The potential effects of  
30 these actions are described below.

- 31 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
32 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect  
33 valley/foothill riparian natural community. The anticipated water levels over time with  
34 Alternative 1A, as compared with No Action, would be slightly lower in the October to May  
35 timeframe. The small changes in frequency of higher water levels in these lakes would not  
36 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of  
37 the reservoir pools. Changes in releases that would influence downstream river flows are  
38 discussed below.
- 39 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
40 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their  
41 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with  
42 Operational Scenario A) would not be expected to result in the permanent reduction in acreage  
43 of valley/foothill riparian natural community along these waterways. There is no evidence that  
44 flow levels in the upstream rivers would change such that the acreage of this community would

1 be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley  
 2 have historically been exposed to significant variations in river stage. Based on modeling  
 3 conducted for the BDCP (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*),  
 4 flow levels in these upstream rivers could be reduced by as much as 19% in the July to  
 5 November time frame when compared to No Action, while flow levels in the February to May  
 6 time frame could increase as much as 48% with implementation of Alternative 1A (Operational  
 7 Scenario A). Similarly, increased diversions of Sacramento River flows in the north Delta would  
 8 not be expected to result in a permanent reduction in valley/foothill riparian community  
 9 downstream of these diversions, even though river flows are modeled to be reduced by 11–27%  
 10 compared with No Action, during certain months and water-year type (see Section 11C.4 in  
 11 Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). Reduced diversions from  
 12 the south Delta channels would not create a reduction in this natural community.

13 The periodic changes in flows in the Sacramento River, Feather River, and American River  
 14 associated with modified reservoir operations, and the increased diversion of Sacramento River  
 15 flows at north Delta intakes associated with Alternative 1A would affect salinity, water  
 16 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in  
 17 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*  
 18 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the  
 19 west Delta and Suisun Marsh as a result of these changed water operations. These salinity  
 20 changes may change the plant composition of riparian habitats along the lower Sacramento and  
 21 San Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes  
 22 would be complicated by anticipated sea level rise and the effects of downstream tidal  
 23 restoration over the life of the Plan. There is the potential that some valley/foothill riparian  
 24 natural community may be degraded immediately adjacent to river channels. The riparian  
 25 communities in the west Delta are dominated by willows, cottonwood and mixed brambles.  
 26 These potential changes are not expected to result in a significant reduction in the acreage and  
 27 value of valley/foothill riparian natural community in the study area.

- 28 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
 29 conveyance facilities and levees associated with the BDCP actions have the potential to require  
 30 removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian  
 31 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these  
 32 habitats. These activities would be subject to normal erosion, turbidity and runoff control  
 33 management practices, including those developed as part of *AMM2 Construction Best*  
 34 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
 35 vegetation removal or earthwork adjacent to or within riparian habitats would require use of  
 36 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*  
 37 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would  
 38 avoid permanent adverse effects on this community.
- 39 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
 40 treatment, would be a periodic activity associated with the long-term maintenance of water  
 41 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
 42 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
 43 control nuisance vegetation could pose a long-term hazard to valley/foothill riparian natural  
 44 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
 45 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or  
 46 direct discharge of herbicides to riparian areas being treated for invasive species removal.

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

- 10 • *Channel dredging.* Long-term operation of the Alternative 1A intakes on the Sacramento River  
11 would include periodic dredging of sediments that might accumulate in front of intake screens.  
12 The dredging could occur adjacent to valley/foothill riparian natural community. This activity  
13 should not adversely affect riparian plants as long as dredging equipment is kept out of riparian  
14 areas and dredge spoil is disposed of outside of riparian corridors.
- 15 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
16 communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a  
17 management plan would be prepared that specifies actions to improve the value of the habitats  
18 for covered species. Actions would include control of invasive nonnative plant and animal  
19 species, fire management, restrictions on vector control and application of herbicides, and  
20 maintenance of infrastructure that would allow for movement through the community. The  
21 enhancement efforts would improve the long-term value of this community for both special-  
22 status and common species.
- 23 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to  
24 valley/foothill riparian natural community in the reserve system. The activities could include  
25 wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*  
26 *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable  
27 restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an  
28 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
29 activities that might affect this natural community. Priority would be given to use of existing  
30 trails and roads, with some potential for new trails. Limited tree removal and limb trimming  
31 could also be involved.

32 The various operations and maintenance activities described above could alter acreage of  
33 valley/foothill riparian natural community in the study area through changes in flow patterns and  
34 resultant changes in water quality. Activities could also introduce sediment and herbicides that  
35 would reduce the value of this community to common and sensitive plant and wildlife species.  
36 Recreation activities could encroach on riparian areas and require occasional tree removal. Other  
37 periodic activities associated with the Plan, including management, protection and enhancement  
38 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
39 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
40 community. While some of these activities could result in small changes in acreage, these changes  
41 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*  
42 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or  
43 minimized by implementation of AMM2, AMM4, AMM5, AMM10, AMM18 and AMM37. The  
44 management actions associated with levee repair, periodic dredging and control of invasive plant  
45 species would also result in a long-term benefit to the species associated with riparian habitats by



1 improving water movement in adjacent waterways and by eliminating competitive, invasive species  
2 of plants.

3 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
4 implementation of Alternative 1A would not result in a net permanent reduction in valley/foothill  
5 riparian natural community within the study area. Therefore, there would be no adverse effect on  
6 the community.

7 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would  
8 have the potential to create minor changes in total acreage of valley/foothill riparian natural  
9 community in the study area, and could create temporary increases in turbidity and sedimentation.  
10 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
11 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, AMM18 and  
12 AMM37 would minimize these impacts; and other operations and maintenance activities, including  
13 management, protection and enhancement actions associated with *CM3 Natural Communities*  
14 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
15 create positive effects, including reduced competition from invasive, nonnative plants in these  
16 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural*  
17 *Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this  
18 natural community in the study area. Ongoing operation, maintenance and management activities  
19 would not result in a net permanent reduction in this sensitive natural community within the study  
20 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural  
21 community.

## 22 **Nontidal Perennial Aquatic**

23 Construction, operation, maintenance and management associated with the conservation  
24 components of Alternative 1A would have no long-term adverse effects on the habitats associated  
25 with the nontidal perennial aquatic natural community. Initial development and construction of  
26 CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this  
27 community (see Table 12-1A-5). Full implementation of Alternative 1A would also include the  
28 following conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic  
29 natural community.

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

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	12	12	9	9	0	0
CM2	24	24	12	12	50–77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>70</b>	<b>253</b>	<b>21</b>	<b>37</b>	<b>50–77</b>	<b>25</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

3

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

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
7 CM4, CM5, and CM6 would permanently eliminate an estimated 298 acres and temporarily remove  
8 35 acres of nontidal perennial aquatic natural community in the study area. These modifications  
9 represent approximately 6% of the 5,567 acres of the community that is mapped in the study area.  
10 Approximately 40% (134 acres) of the permanent and temporary losses would occur during the first  
11 10 years of Alternative 1A implementation, as water conveyance facilities are constructed and  
12 habitat restoration is initiated. Natural communities restoration would add 400 acres (CM10) of  
13 nontidal marsh during the same period, which would expand the area of that habitat and offset the  
14 losses. The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and  
15 nontidal freshwater perennial emergent wetland natural communities, as specified in Objective  
16 NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.6.2) indicates  
17 that implementation of Alternative 4 would result in the restoration of 1,200 acres of nontidal  
18 marsh, and that the restoration would occur in blocks that would be contiguous with the Plan’s  
19 larger reserve system. The nontidal marsh would be restored in the vicinity of giant garter snake  
20 subpopulations identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998).

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

- 1       • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance  
2 facilities would permanently remove 57 acres and temporarily remove 7 acres of nontidal  
3 perennial aquatic community. Most of the permanent loss would occur along the north-south  
4 transmission corridor in the central and southern Delta (see Terrestrial Biology Mapbook). Most  
5 of the temporary loss would occur where temporary access roads would be constructed on  
6 Mandeville and Bouldin Islands. These wetlands are small ponds, stringers and ditches adjacent  
7 to farming roads. These losses would take place during the near-term construction period.
- 8       • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
9 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
10 stilling basin improvements, west side channels modifications, Putah Creek realignment  
11 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could  
12 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish  
13 through the bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
14 permanently lost and another 12 acres could be temporarily removed. This activity would occur  
15 primarily in the near-term timeframe.
- 16       • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
17 footprints, implementation of CM4 would permanently change to tidally influenced inundation  
18 or remove 189 acres of nontidal perennial aquatic community. These losses would be expected  
19 to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An  
20 estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the  
21 restoration (CM10) would happen during the first 10 years of Alternative 1A implementation,  
22 which would coincide with the timeframe of water conveyance facilities construction and early  
23 restoration activities. The remaining restoration would be spread over the following 30 years.  
24 Nontidal natural communities restoration is expected to be focused in CZs 2, 4 and/or 5  
25 identified in Figure 12-1.
- 26       • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain  
27 restoration levee construction would permanently remove 28 acres and temporarily remove 16  
28 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered  
29 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain  
30 restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration  
31 along the southern Delta rivers would improve connectivity for a variety of species that rely on  
32 aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San  
33 Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled  
34 to start following construction of water conveyance facilities, which is expected to take 10 years.
- 35       • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
36 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The  
37 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity  
38 would be on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
39 Nontidal marsh adjacent to these tidal areas could be affected. Channel margin would be  
40 enhanced within the study area on sections of the Sacramento, San Joaquin and Mokelumne  
41 Rivers, and along Steamboat and Sutter Sloughs.
- 42       • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal  
43 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic  
44 and nontidal freshwater perennial emergent natural communities. This marsh restoration  
45 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and  
46 would be accompanied by adjacent grassland restoration or protection.

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

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

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
6 affect the nontidal perennial aquatic community through CM1 construction losses (57 acres  
7 permanent and 7 acres temporary) and the CM2 construction losses (24 acres permanent and 12  
8 acres temporary). The natural community would be lost primarily at scattered locations along the  
9 north-south transmission corridor and along access roads adjacent to the tunnel route in the central  
10 Delta, and along the west side channels and channels associated with the Sacramento and Lisbon  
11 Weirs in the Yolo Bypass. Approximately 34 acres of the inundation and construction-related losses  
12 from CM4 would occur during the near-term throughout several of the ROAs mapped in Figure 12-1.

13 The construction losses of this special-status natural community would represent an adverse effect  
14 if they were not offset by avoidance and minimization measures and restoration actions associated  
15 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would  
16 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the  
17 United States as defined by Section 404 of the CWA. However, creating 400 acres of nontidal marsh  
18 as part of CM10 during the first 10 years of Alternative 1A implementation would more than offset  
19 this near-term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for  
20 restoration and 1:1 for protection) would indicate 134 acres of restoration and 134 acres of  
21 protection would be needed to offset (i.e., mitigate) the 134 acres of loss. While the Plan does not  
22 include protection of nontidal perennial aquatic habitat, it includes well in excess of the typical 1:1  
23 restoration acreage (which includes protection in perpetuity), and therefore compensates for the  
24 lack of protection.

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

#### 31 ***Late Long-Term Timeframe***

32 Implementation of Alternative 1A as a whole would result in relatively minor (6%) losses of  
33 nontidal perennial aquatic community in the study area. These losses (298 acres of permanent and  
34 35 acres of temporary loss) would be largely associated with construction of the water conveyance  
35 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced  
36 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The change to  
37 tidally influenced inundation would occur during the course of the CM4 restoration activities at  
38 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of  
39 1,200 acres of nontidal marsh would be restored over a wide region of the study area, including  
40 within the Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see Figure 12-1).

41 ***NEPA Effects:*** During the first 10 years of implementing Alternative 1A, creating 400 acres of  
42 nontidal marsh as part of CM10 would offset the construction-related and inundation losses of 134  
43 acres of nontidal perennial aquatic natural community. There would be no adverse effect. During the

1 full duration of Plan implementation, Alternative 1A would not result in a net reduction in the  
2 acreage of a sensitive natural community; there would be an expansion of nontidal marsh and the  
3 effect would be beneficial.

4 **CEQA Conclusion:**

5 **Near-Term Timeframe**

6 Alternative 1A would result in the loss of approximately 134 acres of nontidal perennial aquatic  
7 natural community due to construction of the water conveyance facilities (CM1) and fish passage  
8 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration  
9 (CM4). The natural community would be lost at scattered locations in the vicinity of the Sacramento  
10 River intakes and pipelines, and along access roads adjacent to the tunnel route in the central Delta.  
11 The losses would be spread across a 10-year near-term timeframe. These losses would be offset by  
12 planned restoration of 400 acres of nontidal perennial aquatic natural community scheduled for the  
13 first 10 years of Alternative 1A implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and  
14 AMM10 would be implemented to minimize impacts. Because of these offsetting near-term  
15 restoration activities and AMMs, impacts would be less than significant. Typical project-level  
16 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 134 acres of  
17 restoration and 134 acres of protection would be needed to offset (i.e., mitigate) the 134 acres of  
18 loss. While the Plan does not include protection of nontidal perennial aquatic habitat, it includes  
19 well in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and  
20 therefore compensates for the lack of protection. The restoration would be initiated at the beginning  
21 of Alternative 1A implementation to minimize any time lag in the availability of this habitat to  
22 special-status species, and would result in a net gain in acreage of this sensitive natural community.

23 **Late Long-Term Timeframe**

24 At the end of the Plan period, 333 acres of the natural community would be removed and 1,200  
25 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal  
26 perennial aquatic and nontidal freshwater emergent wetland natural communities. There would be  
27 no net permanent reduction in the acreage of this sensitive natural community within the study  
28 area. Therefore, Alternative 1A would not have a substantial adverse effect on this natural  
29 community; the impact on the nontidal perennial aquatic natural community would be beneficial.

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

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

- 38 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 1A  
39 would result in an increase in the frequency, magnitude and duration of inundation of 50-77  
40 acres of nontidal perennial aquatic natural community. The methods used to estimate these  
41 inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
42 *Wildlife, and Plants.* The area more frequently affected by inundation would vary with the flow

1 volume that would pass through the newly constructed notch in the Fremont Weir. The 50-acre  
2 increase in inundation would be associated with a notch flow of 3,000 cubic feet per second  
3 (cfs), and the 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related  
4 increases in flow through Fremont Weir would be expected in 30% of the years. This community  
5 occurs in small stringers and patches throughout the bypass, including along the Tule Canal/Toe  
6 Drain, the western channels north of Interstate 80, and below the Fremont and Sacramento  
7 Weirs. The anticipated change in management of flows in the Yolo Bypass includes more  
8 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some  
9 years, later releases into the bypass in spring months (April and May). The modification of  
10 periodic inundation events would not adversely affect the ecological function of this natural  
11 community and would not substantially modify its value for special-status or common wildlife  
12 species. Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-  
13 term regime of periodic inundation events. The extended inundation would be designed to  
14 expand foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife  
15 and plant species are described in detail in later sections of this chapter.

- 16 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
17 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal  
18 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,  
19 but they would likely be focused in the south Delta area, along the major rivers and Delta  
20 channels. The reconnection of these wetlands to stream flooding events would be beneficial to  
21 the ecological function of nontidal perennial aquatic habitats, especially as they relate to BDCP  
22 target aquatic species. The periodic flooding may also encourage germination of nontidal marsh  
23 vegetation.

24 In summary, 75-102 acres of nontidal perennial aquatic community in the study area would be  
25 subjected to more frequent inundation as a result of implementing two Alternative 1A conservation  
26 measures (CM2 and CM5). Nontidal perennial aquatic habitats in the Yolo Bypass have developed  
27 under a long-term regime of periodic inundation events and inundation along expanded river  
28 floodplains would be infrequent.

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

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

#### 41 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing** 42 **Operation, Maintenance and Management Activities**

43 Once the physical facilities associated with BDCP Alternative 1A are constructed and the stream flow  
44 regime associated with changed water management is in effect, there would be new ongoing and

1 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
2 conservation lands that could affect nontidal perennial aquatic natural community in the study area.  
3 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
4 River flows in the north Delta, and reduced diversions from south Delta channels. These actions  
5 would be associated with CM1 (see Impact BIO-13 for effects associated with CM2). The periodic  
6 actions would involve access road and conveyance facility repair, vegetation management at the  
7 various water conveyance facilities and habitat restoration sites (CM11), levee repair and  
8 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with  
9 natural community management plans. The potential effects of these actions are described below.

- 10 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
11 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect  
12 nontidal perennial aquatic natural community, in the form of the reservoir pools. The  
13 Alternative 1A operations scheme would alter the surface elevations of these reservoir pools as  
14 described in Chapter 6, *Surface Water*. These fluctuations would occur within historic ranges  
15 and would not adversely affect the natural community. Changes in releases that would influence  
16 downstream river flows are discussed below.
- 17 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
18 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
19 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
20 channels (associated with Operational Scenario A) would not result in the permanent reduction  
21 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in  
22 the upstream rivers would not change such that the acreage of nontidal perennial aquatic  
23 community would be reduced on a permanent basis. Some minor increases and some decreases  
24 would be expected to occur along the major rivers during some seasons and in some water-year  
25 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento  
26 River flows in the north Delta would not result in a permanent reduction in nontidal perennial  
27 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are  
28 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced  
29 diversions from the south Delta channels would not create a reduction in this natural  
30 community.
- 31 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
32 conveyance facilities and levees associated with the BDCP actions have the potential to require  
33 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial  
34 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
35 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,  
36 turbidity and runoff control management practices, including those developed as part of *AMM2*  
37 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*  
38 *Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic habitats would  
39 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed  
40 surfaces. Proper implementation of these measures would avoid permanent adverse effects on  
41 this community.
- 42 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
43 treatment, would be a periodic activity associated with the long-term maintenance of water  
44 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
45 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
46 control nuisance vegetation could pose a long-term hazard to nontidal perennial aquatic natural

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

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

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

31 The various operations and maintenance activities described above could alter acreage of nontidal  
32 perennial aquatic natural community in the study area through changes in flow patterns and  
33 changes in periodic inundation of this community. Activities could also introduce sediment and  
34 herbicides that would reduce the value of this community to common and sensitive plant and  
35 wildlife species. Other periodic activities associated with the Plan, including management,  
36 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
37 *Restoration* and *CM11 Natural Communities Enhancement and Management*), would be undertaken  
38 to enhance the value of the community. While some of these activities could result in small changes  
39 in acreage, these changes would be greatly offset by restoration activities planned as part of *CM4*  
40 *Tidal Natural Communities Restoration* and protection actions associated with *CM3 Natural*  
41 *Communities Protection and Restoration*. The management actions associated with levee repair and  
42 control of invasive plant species would also result in a long-term benefit to the species associated  
43 with nontidal perennial aquatic habitats by improving water movement.



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

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

#### 18 **Nontidal Freshwater Perennial Emergent Wetland**

19 Construction, operation, maintenance and management associated with the conservation  
20 components of the BDCP would have no long-term adverse effects on the habitats associated with  
21 the nontidal freshwater perennial emergent wetland natural community. Initial development and  
22 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary  
23 removal of this community (see Table 12-1A-6). Full implementation of Alternative 1A would also  
24 include the following conservation actions over the term of the BDCP to benefit the nontidal  
25 freshwater perennial emergent wetland natural community.

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

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	1	1	1	1	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>66</b>	<b>125</b>	<b>2</b>	<b>2</b>	<b>6-8</b>	<b>8</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

3

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

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
7 CM4, and CM6 would permanently eliminate an estimated 126 acres and temporarily remove 6  
8 acres of nontidal freshwater perennial emergent wetland natural community in the study area.  
9 These modifications represent approximately 9% of the 1,509 acres of the community that is  
10 mapped in the study area. Approximately 55% (73 acres) of the permanent and temporary losses  
11 would happen during the first 10 years of Alternative 1A implementation, as water conveyance  
12 facilities are constructed and habitat restoration is initiated. Natural communities restoration would  
13 add 400 acres (CM10) and natural communities protection would protect 50 acres (CM3) of nontidal  
14 marsh during the same period, which would expand the area of that habitat and offset the losses.  
15 The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and nontidal  
16 freshwater perennial emergent wetland natural communities, as specified in BDCP Objective  
17 NFEW/NPANC1.1 (BDCP Chapter 3, Table 3.3-2). The nontidal marsh protection would be designed  
18 to support tricolored blackbird populations in the study area. The BDCP beneficial effects analysis  
19 (BDCP Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the  
20 restoration of 1,200 acres of nontidal marsh. The restoration would occur in blocks that would be  
21 contiguous with the alternative's larger reserve system. The nontidal marsh would be restored in  
22 the vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.  
23 Fish and Wildlife Service 1998). The same conservation efforts would be a part of implementing  
24 Alternative 1A.

25

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

- 4 ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance  
5 facilities would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater  
6 perennial emergent wetland community. The permanent loss would occur at the southern  
7 forebay construction site (see Terrestrial Biology Mapbook). The temporary loss would occur  
8 where a temporary access road would be constructed on Bouldin Island. These wetlands are  
9 extremely small and remote water bodies. These losses would take place during the near-term  
10 construction period.
- 11 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
12 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
13 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek  
14 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of  
15 these activities could involve excavation and grading in nontidal freshwater perennial emergent  
16 wetland areas to improve passage of fish through the bypasses. Based on hypothetical  
17 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be  
18 temporarily removed. These losses would most likely occur in the Tule Canal and west side  
19 channels at the north end of the bypass. The habitat here includes narrow bands within these  
20 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow  
21 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity  
22 would occur in the near-term timeframe.
- 23 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
24 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal  
25 freshwater perennial emergent wetland community. These losses would be expected to occur  
26 primarily in the Cache Slough ROA (see Figure 12-1). An estimated 1,200 acres of nontidal  
27 marsh would be restored (CM10) and 50 acres would be protected (CM3) during nontidal  
28 habitat conservation actions. Approximately 400 acres of the restoration and 25 acres of the  
29 protection would happen during the first 10 years of Alternative 1A implementation, which  
30 would coincide with the timeframe of water conveyance facilities construction and early tidal  
31 marsh restoration. The remaining restoration would be spread over the following 30 years.  
32 Nontidal marsh natural communities restoration is expected to be focused in the vicinity of giant  
33 garter snake populations in the eastern Delta and near the Yolo Bypass. *CM5 Seasonally  
34 Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain restoration levee  
35 construction would not affect nontidal freshwater perennial emergent wetland natural  
36 community.
- 37 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
38 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of  
39 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
40 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including  
41 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The  
42 improvements would occur within the study area on sections of the Sacramento, San Joaquin  
43 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 44 ● *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal  
45 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic

1 and nontidal freshwater perennial emergent natural communities. This marsh restoration  
2 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and  
3 would be accompanied by adjacent grassland restoration or protection.

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

#### 7 ***Near-Term Timeframe***

8 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
9 affect the nontidal freshwater perennial emergent wetland community through CM1 construction  
10 losses (1 acre permanent and 1 acre temporary) and the CM2 construction losses (25 acres  
11 permanent and 1 acre temporary). These losses would occur at the southern forebay, along  
12 temporary access roads in the central Delta, and in the Yolo Bypass. Approximately 40 acres of the  
13 inundation and construction-related losses from CM4 would occur in the near-term. These losses  
14 would occur primarily in the Cache Slough ROA mapped in Figure 12-1.

15 The construction losses of this special-status natural community would represent an adverse effect  
16 if they were not offset by avoidance and minimization measures and restoration actions associated  
17 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland  
18 natural community would be considered both a loss in acreage of a sensitive natural community and  
19 a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400  
20 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first  
21 10 years of Alternative 1A implementation would offset this near-term loss, avoiding any adverse  
22 effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would  
23 indicate 68 acres of restoration and 68 acres of protection would be needed to offset (i.e., mitigate)  
24 the 68 acres of loss. While the Plan includes just 25 acres of protection in the near-term, it includes  
25 well in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and  
26 therefore compensates for the shortfall in protection.

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

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

34 Implementation of Alternative 1A as a whole would result in small (8%) losses of nontidal  
35 freshwater perennial emergent wetland community in the study area. These losses (125 acres of  
36 permanent and 2 acres of temporary loss) would be largely associated with construction of the  
37 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and  
38 inundation during tidal marsh restoration (CM4). Inundation losses would occur during the course  
39 of the CM4 restoration activities primarily at Cache Slough ROA. By the end of the Plan timeframe, a  
40 total of 1,200 acres of nontidal marsh would be restored and 50 acres would be protected. The  
41 restoration would occur near giant garter snake occupied habitat in the eastern Delta and near Yolo  
42 Bypass, in CZs 2, 4 and 5, and the protection would occur in CZ 1, 2, 8 or 11 to provide nesting  
43 habitat for tri-colored blackbird (see Figure 12-1).

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

8 **CEQA Conclusion:**

9 **Near-Term Timeframe**

10 Alternative 1A would result in the loss of approximately 28 acres of nontidal freshwater perennial  
11 emergent wetland natural community due to construction of the water conveyance facilities (CM1)  
12 and fish passage improvements (CM2). The construction losses would occur at the southern forebay,  
13 along temporary access roads in the central Delta, and in the Yolo Bypass. Approximately 40 acres of  
14 the inundation and construction-related losses from CM4 would occur in the near-term. These  
15 losses would occur primarily in the Cache Slough ROA mapped in Figure 12-1. The losses would be  
16 spread across a 10-year near-term timeframe. These losses would be offset by planned restoration  
17 of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first 10 years of  
18 Alternative 1A implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and AMM10 would  
19 also be implemented to minimize impacts. Because of these offsetting near-term restoration  
20 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios  
21 (1:1 for restoration and 1:1 for protection) would indicate that 68 acres of restoration and 68 acres  
22 of protection would be needed to offset (i.e., mitigate) the 68 acres of loss. While the Plan includes  
23 just 25 acres of protection in the near-term, it includes well in excess of the typical 1:1 restoration  
24 acreage (which includes protection in perpetuity), and therefore compensates for the shortfall in  
25 protection. The restoration and protection would be initiated at the beginning of Alternative 1A  
26 implementation to minimize any time lag in the availability of this habitat to special-status species,  
27 and would result in a net gain in acreage of this sensitive natural community.

28 **Late Long-Term Timeframe**

29 At the end of the Plan period, 127 acres of the natural community would be removed, 1,200 acres of  
30 nontidal marsh would be restored (BDCP Objective NFEW/NPANC1.1), and 50 acres of nontidal  
31 marsh would be protected (BDCP Objective TRBL1.1). There would be no net permanent reduction  
32 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 1A  
33 would not have a substantial adverse effect on this natural community; the impact would be  
34 beneficial.

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

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

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

32       In summary, 14-16 acres of nontidal freshwater perennial emergent wetland community in the  
33 study area would be subjected to more frequent inundation as a result of implementing two  
34 Alternative 1A conservation measures (CM2 and CM5). This community would not be adversely  
35 affected because its habitats in the Yolo Bypass have developed under a long-term regime of  
36 periodic inundation events and inundation along expanded river floodplains would be infrequent.

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

41       ***CEQA Conclusion:*** An estimated 14-16 acres of nontidal freshwater perennial emergent wetland  
42 community in the study area would be subjected to more frequent inundation as a result of  
43 implementing CM2 and CM5 under Alternative 1A. This community would not be significantly  
44 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of  
45 periodic inundation events and inundation along expanded river floodplains would be infrequent.

1 The periodic inundation would not result in a net permanent reduction in the acreage of this  
2 community in the study area. Therefore, there would be no substantial adverse effect on the  
3 community. The impact would be less than significant.

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

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

- 18 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
19 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect  
20 nontidal freshwater perennial emergent wetland natural community. These reservoirs do not  
21 support significant stands of freshwater emergent wetlands. Changes in releases that would  
22 influence downstream river flows are discussed below.
- 23 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
24 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
25 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
26 channels (associated with Operational Scenario A) would not result in the permanent reduction  
27 in acreage of the nontidal freshwater perennial emergent wetland natural community in the  
28 study area. The majority of this wetland type exists outside of the levees of the larger rivers and  
29 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions  
30 of Sacramento River flows in the north Delta would not result in a permanent reduction in  
31 nontidal freshwater perennial emergent wetland community downstream of these diversions.  
32 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of  
33 the river is tidally influenced. Reduced diversions from the south Delta channels would not  
34 create a reduction in this natural community.
- 35 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
36 conveyance facilities and levees associated with the BDCP actions have the potential to require  
37 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater  
38 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity  
39 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to  
40 normal erosion, turbidity and runoff control management practices, including those developed  
41 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
42 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic  
43 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation  
44 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
45 adverse effects on this community.

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

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

- 28       • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
29 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland  
30 natural community, a management plan would be prepared that specifies actions to improve the  
31 value of the habitats for covered species. Actions would include control of invasive nonnative  
32 plant and animal species, fire management, restrictions on vector control and application of  
33 herbicides, and maintenance of infrastructure that would allow for movement through the  
34 community. The enhancement efforts would improve the long-term value of this community for  
35 both special-status and common species.

36       The various operations and maintenance activities described above could alter acreage of nontidal  
37 freshwater perennial emergent wetland natural community in the study area through changes in  
38 flow patterns and changes in periodic inundation of this community. Activities could also introduce  
39 sediment and herbicides that would reduce the value of this community to common and sensitive  
40 plant and wildlife species. Other periodic activities associated with the Plan, including management,  
41 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
42 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
43 enhance the value of the community. While some of these activities could result in small changes in  
44 acreage, these changes would be greatly offset by restoration activities planned as part of *CM10*  
45 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*  
46 *Protection and Restoration*. The management actions associated with levee repair and control of



1 invasive plant species would also result in a long-term benefit to the species associated with  
2 nontidal freshwater perennial emergent wetland habitats by improving water movement.

3 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
4 Alternative 1A would not result in a net permanent reduction in this sensitive natural community  
5 within the study area. Therefore, there would be no adverse effect on the community.

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

## 20 **Alkali Seasonal Wetland Complex**

21 Construction, operation, maintenance and management associated with the conservation  
22 components of Alternative 1A would have no long-term adverse effects on the habitats associated  
23 with the alkali seasonal wetland complex natural community. Initial development and construction  
24 of CM2 and CM4 would result in permanent removal of this community (see Table 12-1A-7). Full  
25 implementation of Alternative 1A would also include the following conservation actions over the  
26 term of the BDCP to benefit the alkali seasonal wetland natural community.

- 27 • Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a  
28 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with  
29 CM3)
- 30 • Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no  
31 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)  
32 (Objective ASWNC1.2, associated with CM3 and CM9)
- 33 • Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
34 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11)

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>58</b>	<b>72</b>	<b>0</b>	<b>0</b>	<b>264-744</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

3

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

6 Construction, land grading and habitat restoration activities that would accompany the  
7 implementation of CM2 and CM4 would permanently eliminate an estimated 72 acres of alkali  
8 seasonal wetland complex natural community in the study area. These modifications represent  
9 approximately 2% of the 3,723 acres of the community that is mapped in the study area. Most of the  
10 losses (58 acres or 80%) would occur during the first 10 years of Alternative 1A implementation, as  
11 Yolo Bypass improvements and habitat restoration is initiated. Alkali seasonal wetland complex  
12 protection (120 acres) and restoration (an estimated 58 acres, but determined by actual level of  
13 effect) would be initiated during the same period, which would offset the. By the end of the Plan  
14 period, 150 acres of this natural community would be protected and 72 acres would be restored.  
15 The BDCP beneficial effects analysis for this community (BDCP Chapter 5, Section 5.4.7.2) states that  
16 Alternative 4 would protect at least 150 acres of alkali seasonal wetland in Conservation Zones 1, 8,  
17 or 11, in a mosaic of protected grasslands and vernal pool complex. This would protect currently  
18 unprotected high-value alkali seasonal wetland complex in the Plan Area. The Alternative 1A  
19 conservation measures would provide the same level of restoration and protection as Alternative 4.

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

- 1       ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance  
2 facilities would not affect alkali seasonal wetland complex natural community.

3       While there would be no direct effects from construction activity associated with CM1, there is  
4 the potential that construction would lead to increased nitrogen deposition in alkali seasonal  
5 wetland habitats in the vicinity of Clifton Court Forebay. A significant number of cars, trucks,  
6 and land grading equipment involved in construction would emit small amounts of atmospheric  
7 nitrogen from fuel combustion; this material could be deposited in sensitive alkali seasonal  
8 wetland areas that are located west of the major construction areas at Clifton Court Forebay.  
9 Nitrogen deposition can pose a risk of adding a fertilizer to nitrogen-limited soils and their  
10 associated plants. Nonnative invasive species can be encouraged by the added nitrogen  
11 available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen Deposition on*  
12 *BDCP Natural Communities*, addresses this issue in detail. It has been concluded that this  
13 potential deposition would pose a low risk of changing the alkali seasonal wetland complex in  
14 the construction area because the construction would occur primarily downwind of the natural  
15 community and the construction would contribute a negligible amount of nitrogen to regional  
16 projected emissions. No adverse effect is expected.

- 17       ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
18 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
19 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
20 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and  
21 grading in alkali seasonal wetland complex as a new channel is constructed. Based on  
22 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex  
23 is located immediately south of the existing Putah Creek channel within the bypass, and is a  
24 relatively large, moderate to high value, contiguous expanse of this community. This loss would  
25 occur in the near-term timeframe.

- 26       ● *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 150 acres  
27 of alkali seasonal wetland complex in CZs 1, 8, and 11 (Objective ASWNC1.1). The protection  
28 would occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented  
29 natural landscapes supporting a diversity of native plant and wildlife species. These areas would  
30 be both protected and enhanced to increase the cover of alkali seasonal wetland plants relative  
31 to nonnative species.

- 32       ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
33 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali  
34 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the  
35 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh  
36 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in  
37 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.  
38 These losses would not fragment the alkali seasonal wetland communities adjacent to these  
39 sloughs because the losses would occur on the edges of the existing habitat.

- 40       ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: BDCP CM9 includes both  
41 vernal pool complex and alkali seasonal wetland complex restoration goals. The intent of the  
42 conservation measure is to match the acreage of restoration with the actual acreage lost to other  
43 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal  
44 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of  
45 the BDCP's restoration period. The goal is for no net loss of this natural community, consistent

1 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA  
2 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat  
3 connectivity goals mapped in Figure 12-2 and described in Table 3.2-3 of BDCP Chapter 3.

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

#### 7 ***Near-Term Timeframe***

8 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
9 affect the alkali seasonal wetland complex natural community through CM2 construction losses (45  
10 acres). These losses would occur in the Yolo Bypass south of Putah Creek. Approximately 13 acres of  
11 the inundation and construction-related losses in habitat from CM4 would occur in the near-term.  
12 These losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped in Figure  
13 12-1.

14 The construction losses of this special-status natural community would represent an adverse effect  
15 if they were not offset by avoidance and minimization measures and restoration actions associated  
16 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community  
17 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
18 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland  
19 complex as part of CM3 and the restoration of up to 58 acres of this community as part of CM9  
20 during the first 10 years of Alternative 1A implementation would offset this near-term loss, avoiding  
21 any adverse effect. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)  
22 would indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e.,  
23 mitigate) the 58 acres of loss.

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

#### 29 ***Late Long-Term Timeframe***

30 Implementation of Alternative 1A as a whole would result in relatively minor (2%) losses of alkali  
31 seasonal wetland natural community in the study area. These losses (72 acres) would be largely  
32 associated with construction of Yolo Bypass fish improvements (CM2) and inundation during tidal  
33 marsh restoration (CM4). Inundation losses would occur during the course of the Plan's restoration  
34 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

35 ***NEPA Effects:*** In the first 10 years of implementing Alternative 1A conservation measures, 120 acres  
36 of alkali seasonal wetland complex would be protected as part of CM3 and up to 58 acres of this  
37 community would be restored as part of CM9. These conservation actions would offset the near-  
38 term loss of this community associated with CM2 and CM4, avoiding any adverse effect. By the end  
39 of the Plan timeframe, Alternative 1A would protect a total of 150 acres of alkali seasonal wetland  
40 natural community (CM3) and would restore up to 72 acres (CM9). The protection and restoration  
41 would occur primarily in CZ 1, CZ 8 and/or CZ 11, in the Cache Slough, Suisun Marsh and Clifton  
42 Court Forebay areas. Therefore, Alternative 1A would not have an adverse effect on the alkali  
43 seasonal wetland complex natural community.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Alternative 1A would result in the permanent loss of approximately 58 acres of alkali seasonal  
4 wetland complex natural community due to construction of fish passage improvements (CM2) and  
5 inundation during tidal marsh restoration (CM4). The construction losses would occur primarily in  
6 the area just south of Putah Creek in the Yolo Bypass, while inundation losses would occur in the  
7 Cache Slough and Suisun Marsh ROAs. The losses would be spread across a 10-year near-term  
8 timeframe.

9 The construction losses of this special-status natural community would represent an adverse effect  
10 if they were not offset by avoidance and minimization measures and other actions associated with  
11 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would  
12 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
13 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland  
14 complex as part of CM3 and the restoration of 58 acres of this community as part of CM9 during the  
15 first 10 years of Alternative 1A implementation would offset this near-term loss, avoiding any  
16 significant impact. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)  
17 would indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e.,  
18 mitigate) the 58 acres of loss. AMM1, AMM2, AMM3, AMM4, and AMM10 would also be implemented  
19 to minimize impacts. Because of the offsetting protection and restoration activities and AMMs,  
20 impacts would be less than significant.

21 **Late Long-Term Timeframe**

22 At the end of the Plan period, 72 acres of alkali seasonal wetland complex natural community would  
23 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres  
24 would be restored. The restoration acres actually developed would depend on the number of acres  
25 affected during Alternative 1A implementation. There would be no net permanent reduction in the  
26 acreage of this natural community within the study area. Therefore, Alternative 1A would have a  
27 less-than-significant impact on this natural community.

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

30 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation/flooding regime of the Yolo  
31 Bypass, a man-made waterway. CM2, which is designed to improve fish passage and shallow flooded  
32 habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal  
33 wetland complex natural community at scattered locations in the central and southern sections of  
34 the bypass.

35 Operation of the Yolo Bypass under Alternative 1A would result in an increase in the frequency and  
36 duration of inundation on an estimated 264–744 acres of alkali seasonal wetland complex natural  
37 community. The methods used to estimate these inundation acreages are described in BDCP  
38 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected  
39 by inundation would vary with the flow volume that would pass through the newly constructed  
40 notch in the Fremont Weir. The 264-acre increase in inundation would be associated with a notch  
41 flow of 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a notch flow of  
42 4,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the

1 years. The alkali seasonal wetland complex natural community occurs primarily in the central and  
2 southern reaches of the bypass, south of Putah Creek. The stands in this location are relatively large,  
3 with moderate to high value for associated plant and wildlife species. The anticipated change in  
4 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass  
5 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring  
6 months (April and May).

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

12 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural  
13 community in the Yolo Bypass would be subjected to more frequent inundation as a result of  
14 implementing CM2 under Alternative 1A. This natural community is conditioned to periodic  
15 inundation; the slight increase in periodic inundation would not result in a net permanent reduction  
16 in the acreage of this community in the study area, although some change in plant species  
17 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural  
18 community in the Yolo Bypass would have a less-than-significant impact on this natural community.  
19 The effects of this inundation on wildlife and plant species are described in detail in later sections of  
20 this chapter.

## 21 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from** 22 **Ongoing Operation, Maintenance and Management Activities**

23 Once the physical facilities associated with BDCP Alternative 1A were constructed and the stream  
24 flow regime associated with changed water management was in effect, there would be new ongoing  
25 and periodic actions associated with operation, maintenance and management of the BDCP facilities  
26 and conservation lands that could affect alkali seasonal wetland complex natural community in the  
27 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,  
28 reduced diversions from south Delta channels and recreation in and adjacent to Plan reserves. These  
29 actions are associated with CM1 and CM11 (see Impact BIO-19 for effects associated with CM2). The  
30 periodic actions would involve access road and conveyance facility repair, vegetation management  
31 at the various water conveyance facilities and habitat restoration sites (CM11), levee repair and  
32 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with  
33 natural community management plans. The potential effects of these actions are described below.

- 34 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
35 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
36 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
37 channels (associated with Operational Scenario A) would not affect alkali seasonal wetland  
38 natural community. This natural community does not exist within or adjacent to the active  
39 Sacramento River system channels and Delta waterways that would be affected by modified  
40 flow levels.
- 41 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
42 conveyance facilities and levees associated with the BDCP actions have the potential to require  
43 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali  
44 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff

1 entering these habitats. These activities would be subject to normal erosion and runoff control  
2 management practices, including those developed as part of *AMM2 Construction Best*  
3 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
4 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats  
5 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces  
6 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper  
7 implementation of these measures would avoid permanent adverse effects on this community.

- 8 • *Vegetation management*. Vegetation management, in the form of physical removal and chemical  
9 treatment, would be a periodic activity associated with the long-term maintenance of water  
10 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
11 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
12 control nuisance vegetation could pose a long-term hazard to alkali seasonal wetland complex  
13 natural community at or adjacent to treated areas. The hazard could be created by uncontrolled  
14 drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural  
15 community, or direct discharge of herbicides to alkali seasonal wetland complex areas being  
16 treated for invasive species removal. Environmental commitments and *AMM5 Spill Prevention,*  
17 *Containment, and Countermeasure Plan* have been made part of the BDCP to reduce hazards to  
18 humans and the environment from use of various chemicals during maintenance activities,  
19 including the use of herbicides. These commitments are described in Appendix 3B, including the  
20 commitment to prepare and implement spill prevention, containment, and countermeasure  
21 plans and stormwater pollution prevention plans. Best management practices, including control  
22 of drift and runoff from treated areas, and use of herbicides approved for use in terrestrial  
23 environments would also reduce the risk of affecting natural communities adjacent to water  
24 conveyance features and levees associated with restoration activities.
- 25 • *Habitat enhancement*. The BDCP includes a long-term management element for the natural  
26 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural  
27 community, a management plan would be prepared that specifies actions to improve the value  
28 of the habitats for covered species. Actions would include control of invasive nonnative plant  
29 and animal species, fire management, restrictions on vector control and application of  
30 herbicides, and maintenance of infrastructure that would allow for movement through the  
31 community. The enhancement efforts would improve the long-term value of this community for  
32 both special-status and common species.
- 33 • *Recreation*. The BDCP would allow for certain types of recreation in and adjacent to alkali  
34 seasonal wetland natural community in the reserve system. The activities could include wildlife  
35 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP  
36 Chapter 3, Section 3.4.11) describes this program and identifies applicable restrictions on  
37 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an  
38 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
39 activities that might affect this natural community. Most recreation would be docent-led wildlife  
40 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails  
41 would be constructed.

42 The various operations and maintenance activities described above could alter acreage of alkali  
43 seasonal wetland complex natural community in the study area. Activities could introduce sediment  
44 and herbicides that would reduce the value of this community to common and sensitive plant and  
45 wildlife species. Other periodic activities associated with the Plan, including management,  
46 protection and enhancement actions associated with *CM3 Natural Communities Protection and*

1 *Restoration and CM11 Natural Communities Enhancement and Management*, would be undertaken to  
2 enhance the value of the community. While some of these activities could result in small changes in  
3 acreage, these changes would be offset by protection and restoration activities planned as part of  
4 *CM3 Natural Communities Protection and Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
5 *Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10,  
6 and AMM37. The management actions associated with control of invasive plant species would also  
7 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats  
8 by eliminating competitive, invasive species of plants.

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

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

### 27 **Vernal Pool Complex**

28 Construction, operation, maintenance and management associated with the Alternative 1A  
29 conservation components would have no long-term adverse effects on the habitats associated with  
30 the vernal pool complex natural community. Construction of CM1 and habitat restoration associated  
31 with CM4 would result in permanent removal of 375 acres of this community (see Table 12-1A-8).  
32 Full implementation of Alternative 1A would also include the following conservation actions over  
33 the term of the BDCP to benefit the vernal pool complex natural community.

- 34 • Protect at least 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11,  
35 primarily in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3)
- 36 • Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of  
37 vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all  
38 anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15%  
39 density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9)

40 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
41 3.3 that would improve the value of vernal pool complex natural community for terrestrial species.  
42 As explained below, with the protection, restoration and enhancement of the amounts of habitat  
43 listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural



1 community would not be adverse for NEPA purposes and would be less than significant for CEQA  
2 purposes.

3 **Table 12-1A-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative**  
4 **1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	3	3	0	0	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>204</b>	<b>375</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

5

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

8 Construction, land grading and habitat restoration activities that would accompany the  
9 implementation of CM1 and CM4 could permanently eliminate an estimated 375 acres of vernal pool  
10 complex natural community in the study area. These acreages are based on the proposed location of  
11 the CM1 construction footprint and a theoretical footprint for CM4 tidal marsh restoration activities.  
12 The loss of this 375 acres would represent approximately 3% of the 12,133 acres of the community  
13 that is mapped in the study area. An estimated 204 acres of the loss could occur during the first 10  
14 years of Alternative 1A implementation, as the water conveyance facility is constructed and tidal  
15 marsh restoration is initiated. Vernal pool complex protection (400 acres) and restoration (an  
16 estimated 40 acres, with actual restoration based on level of effect) would be initiated during the  
17 first 10 years of Alternative 1A implementation to counteract the loss of habitat. By the end of the  
18 Plan period, 600 acres of this natural community would be protected and up to 67 acres would be  
19 restored. Because of the high sensitivity of this natural community and its shrinking presence in the  
20 Plan Area, avoidance and minimization measures have been built into the BDCP to eliminate the  
21 majority of this potential loss. The BDCP beneficial effect analysis (BDCP Chapter 5, Section 5.4.8.2)  
22 indicates that implementation of Alternative 4 would protect at least 600 acres of vernal pool  
23 complex in Conservation Zones 1, 8, and 11 and additional vernal pool complex would be restored to

1 achieve no net loss of this community. The same conservation actions for vernal pool complex  
2 natural community would be implemented for Alternative 1A.

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

- 6 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance  
7 facilities would directly affect 3 acres of vernal pool complex natural community. The  
8 permanent loss would occur along the southern edge of Clifton Court Forebay, where the  
9 forebay would be expanded to provide greater storage capacity (see Figure 12-1 and the  
10 Terrestrial Biology Mapbook).

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

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

- 32 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 600 acres  
33 of vernal pool complex in CZs 1, 8, and 11 (BDCP Objective VPNC1.1). The protection would  
34 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented  
35 natural landscapes supporting a diversity of native plant and wildlife species. These areas would  
36 be both protected and enhanced to increase the cover of vernal pool complex plants relative to  
37 nonnative species.
- 38 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
39 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and  
40 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal  
41 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres  
42 could be affected. The principal areas likely to be affected include the Cache Slough drainage just  
43 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.

- 1 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal  
2 pool complex and alkali seasonal wetland complex restoration goals. The current estimate for  
3 vernal pool complex restoration is 40 acres in the near-term and a total of 67 acres by the end of  
4 the BDCP's restoration period. This restoration conservation measure includes the "no net loss"  
5 policy normally applied to this natural community (BDCP Objective VPNC1.2), and the intent is  
6 that vernal pool complex restoration would occur prior to or concurrent with impacts (BDCP  
7 Chapter 3, Section 3.4.4.27).

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

### 11 ***Near-Term Timeframe***

12 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
13 affect 204 acres of vernal pool complex natural community through inundation or construction-  
14 related losses in habitat from CM1 and CM4 activities. This loss would likely occur in the Cache  
15 Slough or Suisun Marsh ROAs, and immediately adjacent to Clifton Court Forebay mapped in Figure  
16 12-1.

17 The construction or inundation loss of this special-status natural community would represent an  
18 adverse effect if it were not offset by avoidance and minimization measures and restoration actions  
19 associated with BDCP conservation components. Loss of vernal pool complex natural community  
20 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
21 defined by Section 404 of the CWA. However, the protection of 400 acres of vernal pool complex as  
22 part of CM3 and the restoration of an estimated 40 acres of this community (with a commitment to  
23 keep pace with actual losses) as part of CM9 during the first 10 years of Alternative 1A  
24 implementation would partially offset this near-term loss. The Plan focuses this protection in the  
25 core vernal pool areas identified in the USFWS vernal pool recovery plan (U.S. Fish and Wildlife  
26 Service 2005). The core areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). Typical project-level  
27 mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 408 acres of protection  
28 and 204 acres of restoration would be needed to offset (i.e., mitigate) the 204 acres of loss. Without  
29 additional avoidance and minimization measures to reduce the potential effect, the proposed  
30 protection and restoration would not meet the typical mitigation for vernal pool complex losses.

31 To avoid this adverse effect, the BDCP includes commitments to implement *AMM1 Worker*  
32 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*  
33 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*  
34 *of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM30*  
35 *Transmission Line Design and Alignment Guidelines*. All of these AMMs include elements that avoid or  
36 minimize the risk of affecting habitats at work areas. AMM12 limits the direct removal of vernal pool  
37 crustacean habitat to no more than 10 wetted acres and the indirect effect to no more than 20  
38 wetted acres through the life of the Plan. The 10 wetted acres is equivalent to approximately 67  
39 acres of vernal pool complex natural community. The AMMs are described in detail in BDCP  
40 Appendix 3.C. With these AMMs in place, the BDCP would not adversely affect vernal pool complex  
41 natural community in the near-term.

1 **Late Long-Term Timeframe**

2 The late long-term effect on vernal pool complex natural community would be 375 acres of  
3 permanent loss. The loss would be associated with the construction of CM1 facilities in the vicinity  
4 of Clifton Court Forebay and the ongoing restoration of tidal wetland in the Cache Slough and Suisun  
5 Marsh ROAs. However, 600 acres would be protected (CM3) and up to 67 acres would be restored  
6 (CM9) through the course of the Alternative 1A implementation. In addition, the avoidance and  
7 minimization measures listed above would reduce the actual loss of this community to no more than  
8 10 wetted acres of vernal pool crustacean habitat (an estimated 67 acres of vernal pool complex  
9 natural community) from direct activities and 20 acres of crustacean habitat from indirect effects.

10 **NEPA Effects:** The conservation measures associated with Alternative 1A include protection of 400  
11 acres (CM3) and restoration of an estimated 40 acres (CM9) of vernal pool complex in the near-term  
12 time frame. The Plan focuses the protection in the core vernal pool areas identified in the USFWS  
13 vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and  
14 CZ 11 (see Figure 12-1). In addition, Alternative 1A includes AMM12 which limits the removal of  
15 vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more  
16 than 20 wetted acres through the life of the Plan. With this and other AMMs in place, the BDCP  
17 would not adversely affect vernal pool complex natural community in the near-term. With these  
18 conservation measures and AMMs in effect through the entire Plan period, Alternative 1A would not  
19 have an adverse effect on the vernal pool complex natural community in the long term.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 During the 10-year near-term time frame, Alternative 1A could result in the loss of approximately  
23 204 acre of vernal pool complex natural community due to inundation during water conveyance  
24 facilities construction (CM1) and tidal marsh restoration (CM4). The losses would likely occur in the  
25 Cache Slough or Suisun Marsh ROAs, and immediately adjacent to Clifton Court Forebay. The  
26 construction and inundation-related loss of this special-status natural community would represent  
27 a significant impact if it were not offset by avoidance and minimization measures and other actions  
28 associated with BDCP conservation components. Loss of vernal pool complex natural community  
29 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
30 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of  
31 CM3 and the restoration of an estimated 40 acres of this community (with a commitment to keep  
32 pace with actual losses) as part of CM9 during the first 10 years of Alternative 1A implementation  
33 would partially offset this near-term loss. Typical project-level mitigation ratios (2:1 for protection  
34 and 1:1 for restoration) would indicate 408 acres of protection and 204 acres of restoration would  
35 be needed to offset (i.e., mitigate) the 204 acres of loss. Without additional avoidance and  
36 minimization measures to reduce the potential impact, the proposed protection and restoration  
37 would not meet the typical mitigation for vernal pool complex losses. However, Alternative 1A also  
38 includes AMM1, AMM2, AMM3, AMM4, AMM10, AMM12 and AMM30 to minimize impacts. AMM12  
39 places a strict limit on the acres of wetted vernal pool crustacean habitat that can be lost to  
40 conservation actions (10 acres of direct and 20 acres of indirect loss; equivalent to approximately 67  
41 acres of direct loss and 134 acres of indirect loss of vernal pool complex, respectively). Because of  
42 the offsetting protection and restoration activities and implementation of the AMMs, impacts would  
43 be less than significant.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 375 acres of vernal pool complex natural community could be  
3 permanently removed. Through CMs 3 and 9, 600 acres of vernal pool complex natural community  
4 would be protected and up to 67 acres would be restored. In addition, AMM12 would limit the acres  
5 of wetted vernal pool crustacean habitat loss to 10 acres from direct actions and 20 acres from  
6 indirect actions. These wetted acres are equivalent to approximately 67 acres and 134 acres of  
7 vernal pool complex, respectively. There would be no net permanent reduction in the acreage of this  
8 natural community within the study area. Alternative 1A would have a less-than-significant impact  
9 on this natural community.

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

12 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation/flooding regime of the Yolo  
13 Bypass, a man-made waterway. CM2, which is designed to improve fish passage and shallow flooded  
14 habitat for Delta fishes in the Yolo Bypass, could increase periodic inundation of a small acreage of  
15 vernal pool complex natural community in the southern section of the bypass, south of Putah Creek.

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

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

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

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

42 Once the physical facilities associated with Alternative 1A are constructed and the stream flow  
43 regime associated with changed water management is in effect, there would be new ongoing and

1 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
2 conservation lands that could affect vernal pool complex natural community in the study area. The  
3 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced  
4 diversions from south Delta channels, and recreational activities in Plan reserves. These actions are  
5 associated with CM1 and CM11 (see Impact BIO-22 for effects associated with CM2). The periodic  
6 actions would involve access road and conveyance facility repair, vegetation management at the  
7 various water conveyance facilities and habitat restoration sites (CM11), levee repair and  
8 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with  
9 natural community management plans. The potential effects of these actions are described below.

- 10 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
11 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
12 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
13 channels (associated with Operational Scenario A) would not affect vernal pool complex natural  
14 community. This natural community does not exist within or adjacent to the major Sacramento  
15 River system and Delta waterways.
- 16 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
17 conveyance facilities and levees associated with the BDCP actions have the potential to require  
18 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool  
19 complex habitats. This activity could lead to increased soil erosion and runoff entering these  
20 habitats. These activities would be subject to normal erosion and runoff control management  
21 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
22 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or  
23 earthwork adjacent to vernal pool complex habitats would require use of sediment barriers, soil  
24 stabilization and revegetation of disturbed surfaces as part of (*AMM10 Restoration of*  
25 *Temporarily Affected Natural Communities*). Proper implementation of these measures would  
26 avoid permanent adverse effects on this community.
- 27 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
28 treatment, would be a periodic activity associated with the long-term maintenance of water  
29 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
30 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
31 control nuisance vegetation could pose a long-term hazard to vernal pool complex natural  
32 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
33 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or  
34 direct discharge of herbicides to vernal pool complex areas being treated for invasive species  
35 removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the  
37 environment from use of various chemicals during maintenance activities, including the use of  
38 herbicides. These commitments are described in Appendix 3B, including the commitment to  
39 prepare and implement spill prevention, containment, and countermeasure plans and  
40 stormwater pollution prevention plans. Best management practices, including control of drift  
41 and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic  
42 environments would also reduce the risk of affecting natural communities adjacent to water  
43 conveyance features and levees associated with restoration activities.
- 44 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
45 communities within the Plan Area (CM11). For the vernal pool complex natural community, a  
46 management plan would be prepared that specifies actions to improve the value of the habitats

1 for covered species. Actions would include control of invasive nonnative plant and animal  
2 species, fire management, restrictions on vector control and application of herbicides, and  
3 maintenance of infrastructure that would allow for movement through the community. The  
4 enhancement efforts would improve the long-term value of this community for both special-  
5 status and common species.

- 6 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool  
7 complexes in the reserve system. The activities could include wildlife and plant viewing and  
8 hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
9 3.4.11 describes this program and identifies applicable restrictions on recreation that might  
10 adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure  
11 (AMM37) that further dictates limits on recreation activities that might affect vernal pools.  
12 Recreational trails would be limited to existing trails and roads. New trail construction would be  
13 prohibited within the vernal pool complex reserves. It is expected that most activities would be  
14 docent-led tours of reserves, minimizing adverse effects.

15 The various operations and maintenance activities described above could alter acreage of vernal  
16 pool complex natural community in the study area. Activities could introduce sediment and  
17 herbicides that would reduce the value of this community to common and sensitive plant and  
18 wildlife species. Other periodic activities associated with the Plan, including management,  
19 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
20 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
21 enhance the value of the community. While some of these activities could result in small changes in  
22 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*  
23 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of  
24 AMM2, AMM4, AMM5, AMM10, AMM12, AMM30 and AMM37. The management actions associated  
25 with control of invasive plant species would also result in a long-term benefit to the species  
26 associated with vernal pool complex habitats by eliminating competitive, invasive species of plants.

27 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
28 Alternative 1A would not result in a net permanent reduction in the vernal pool complex natural  
29 community within the study area. Therefore, there would be no adverse effect on the community.

30 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would  
31 have the potential to create minor changes in total acreage of vernal pool complex natural  
32 community in the study area, and could create temporary increases in sedimentation or damage  
33 from recreational activity. The activities could also introduce herbicides periodically to control  
34 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,  
35 AMM5, AMM10, AMM12, AMM30 and AMM37 would minimize these impacts, and other operations  
36 and maintenance activities, including management, protection and enhancement actions associated  
37 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
38 *Enhancement and Management*, would create positive effects, including reduced competition from  
39 invasive, nonnative plants in these habitats. Long-term restoration activities associated with *CM9*  
40 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with  
41 *CM3 Natural Communities Protection and Restoration* would ensure that the acreage of this natural  
42 community would not decrease in the study area. Ongoing operation, maintenance and management  
43 activities would not result in a net permanent reduction in this natural community within the study  
44 area. Therefore, there would be a less-than-significant impact.

1       **Managed Wetland**

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

- 7       ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
8       in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- 9       ● Create at least 320 acres of managed wetlands consisting of greater sandhill crane roosting  
10       habitat in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in  
11       Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood  
12       events (Objective GSHC1.3, associated with CM10).
- 13       ● Create two wetland complexes within the SLNWR refuge boundary. Each complex would consist  
14       of at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One of the  
15       wetland complexes may be replaced by 180 acres of cultivated lands that are flooded following  
16       harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with CM10).

17       In addition to this conservation action, creation of similar habitat values by restoring tidal brackish  
18       emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the  
19       losses of managed wetland. The net effect would be a substantial decrease in the amount of  
20       managed wetlands, but an increase in similar habitat value for special-status and common species as  
21       the managed wetland is converted to tidal marsh. Impacts on this natural community would not be  
22       adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to Impacts  
23       BIO-178 through BIO-183 in the *Shorebirds and Waterfowl* discussion at the end of this section  
24       (Section 12.3.3.2) for further consideration of the effects of removing managed wetland natural  
25       community.



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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	3	3	83	83	0	0
CM2	24	24	44	44	931–2,612	0
CM4	5,718	12,786	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>5,745</b>	<b>12,813</b>	<b>127</b>	<b>127</b>	<b>931–2,612</b>	<b>6</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

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

5 Construction, land grading and habitat restoration activities that would accompany the  
6 implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 12,813  
7 acres of managed wetland in the study area. This modification represents approximately 18% of the  
8 70,798 acres of managed wetland that is mapped in the study area. This loss would occur through  
9 the course of the BDCP restoration program, as construction activity and tidal marsh restoration  
10 proceeds. Managed wetland protection (8,100 acres) and restoration (500 acres) would take place  
11 over the same period, but would not replace the acreage lost. The BDCP beneficial effects analysis  
12 for Alternative 4 (BDCP Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of managed  
13 wetlands would be protected, of which at least 1,500 acres would be located within the Grizzly  
14 Island marsh complex, consistent with the U.S. Fish and Wildlife Service salt marsh harvest mouse  
15 recovery plan. Although the primary purpose of the 1,500 acres of protection is to protect and  
16 enhance habitat for the salt marsh harvest mouse, it is also expected to benefit the managed wetland  
17 natural community and the diversity of species that use it, including migratory waterfowl and the  
18 western pond turtle. These same conservation actions would be implemented with Alternative 1A.

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

- 22 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1A water conveyance  
23 facilities would permanently remove 3 acres and temporarily remove 83 acres of managed

1 wetland community. The permanent loss would occur primarily on the southeastern side of  
2 Tyler Island, adjacent to the North Mokelumne River where a permanent access road to a tunnel  
3 shaft site would be constructed. Small permanent losses could also occur where transmission  
4 lines are constructed across Mandeville Island. A barge unloading facility, batch plant and tunnel  
5 work area would create temporary effects on southeastern Tyler Island, but the main temporary  
6 loss would occur immediately west of Stone Lakes National Wildlife Refuge, between Intakes 1  
7 and 2. A large spoil and borrow area is planned at this location (see Terrestrial Biology  
8 Mapbook). These losses would take place during the near-term construction period.

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
10 construction activities that could permanently or temporarily remove managed wetland,  
11 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir  
12 modification and Sacramento Weir improvements. All of these activities could involve  
13 excavation and grading in managed wetland areas to improve passage of fish through the  
14 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
15 permanently removed and 44 acres could be temporarily removed. This activity would occur  
16 primarily in the near-term timeframe.
- 17 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
18 footprints, implementation of CM4 would permanently inundate or remove 12,813 acres of  
19 managed wetland community. These losses would be expected to occur primarily in the Suisun  
20 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).  
21 These acres of managed wetland would be converted to natural wetland, including large  
22 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These  
23 natural wetlands provide comparable or improved habitat for the special-status species that  
24 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in  
25 fragmentation of managed wetland, as most species are capable of utilizing both communities.  
26 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be  
27 enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as  
28 established by BDCP Objective NWNC1.1. All of the restoration and 4,800 acres of the protection  
29 would happen during the first 10 years of Alternative 1A implementation, which would coincide  
30 with the timeframe of water conveyance facilities construction and early implementation of  
31 CM4. The remaining restoration would be spread over the following 30 years. Managed wetland  
32 restoration is expected to include 500 acres in CZs 3, 4, 5, and 6 to benefit sandhill crane, as  
33 stated in BDCP Objectives GSHC1.3 and GSHC1.4 (Figure 12-1). The enhancement and protection  
34 would be focused in Suisun Marsh, but could also occur in CZs with existing managed wetland  
35 (CZs 1, 2, 4, 5, 6, and 7).
- 36 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
37 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of  
38 this loss cannot be quantified at this time, but the majority of the enhancement activity would  
39 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
40 Managed wetland adjacent to these tidal areas could be affected. The improvements would  
41 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,  
42 and along Steamboat and Sutter Sloughs.

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

1       **Near-Term Timeframe**

2       During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
3       permanently remove 5,745 acres and temporarily remove 127 acres of managed wetland through  
4       inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Three acres  
5       of the permanent loss and 83 acres of the temporary loss would be associated with construction of  
6       the water conveyance facilities (CM1). These near-term losses would occur in various locations, but  
7       the majority of the near-term loss would occur immediately east of Stone Lakes National Wildlife  
8       Refuge for spoil and borrow activity, and in Suisun Marsh and the lower Yolo Bypass as tidal marsh  
9       is restored.

10       The construction or inundation loss of this special-status natural community would represent an  
11       adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural  
12       community would be considered both a loss in acreage of a sensitive natural community and  
13       potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are  
14       interspersed with small natural wetlands that would be regulated under Section 404. The  
15       restoration of 500 acres and protection and enhancement of 4,800 acres of managed wetland as part  
16       of CM3 and CM10 during the first 10 years of Alternative 1A implementation would fully offset the  
17       losses associated with CM1, but would only partially offset the total near-term loss. Typical project-  
18       level mitigation ratios (1:1 for protection) would indicate 86 acres of protection would be needed to  
19       offset the 86 acres of loss associated with CM1; a total of 5,872 acres of protection would be needed  
20       to offset (i.e., mitigate) the 5,872 acres of permanent and temporary loss from all near-term actions.  
21       The combined protection and restoration proposed for managed wetland in the near-term would  
22       fall 572 acres short of full replacement. However, the CM4 marsh restoration activities that would be  
23       creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland  
24       and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-  
25       term. This acreage would significantly exceed the number of acres of managed wetlands lost.  
26       Mitigation measures would also be implemented to reduce the effects of managed wetland loss on  
27       waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation  
28       Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to  
29       replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*  
30       *Biology Effects* discussion later in this section.

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

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

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 12,813 acres of managed wetland natural community would be  
3 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would  
4 be restored. There would be a net permanent reduction in the acreage of this special-status natural  
5 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal  
6 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this  
7 managed wetland.

8 **NEPA Effects:** During the near-term timeframe, Alternative 1A would permanently remove 5,745  
9 acres and temporarily remove 127 acres of managed wetland through inundation or construction-  
10 related losses in habitat from CM1, CM2, and CM4 activities. Through the course of Plan  
11 implementation, Alternative 1A would result in a permanent loss of 12,813 acres of managed  
12 wetland within the study area; however, it would also protect and enhance 8,100 acres and restore  
13 500 acres of this habitat. In addition, Alternative 1A would restore 6,000 acres of tidal brackish  
14 emergent wetland and 24,000 acres of tidal freshwater emergent wetland that support similar  
15 ecological functions to those of managed wetland. Therefore, there would be no adverse effect on  
16 managed wetland natural community.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
20 permanently remove 5,745 acres and temporarily remove 127 acres of managed wetland through  
21 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Eighty-six  
22 acres of this loss (including temporary and permanent effects) would be associated with  
23 construction of the water conveyance facilities (CM1). These losses would occur in various locations,  
24 but the majority of the near-term loss would occur immediately east of Stone Lake National Wildlife  
25 Refuge from borrow and spoil activity, and in Suisun Marsh and the lower Yolo Bypass as tidal  
26 marsh is restored.

27 The construction or inundation loss of this special-status natural community would represent a  
28 significant impact if it were not offset by other conservation actions. Loss of managed wetland  
29 natural community would be considered both a loss in acreage of a sensitive natural community and  
30 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and  
31 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during  
32 the first 10 years of Alternative 1A implementation would fully offset the losses associated with  
33 CM1, but would only partially offset the total near-term loss. Typical project-level mitigation ratios  
34 (1:1 for protection) would indicate 86 acres of protection would be needed to offset the 86 acres of  
35 loss associated with CM1; a total of 5,872 acres of protection would be needed to offset (i.e.,  
36 mitigate) the 5,872 acres of permanent and temporary loss from all near-term actions. The  
37 combined protection and restoration proposed for managed wetland in the near-term would fall  
38 572 acres short of full replacement. However, the CM4 marsh restoration activities that would be  
39 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland  
40 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-  
41 term. This acreage would significantly exceed the number of acres of managed wetland lost.  
42 Mitigation measures would also be implemented to reduce the effects of managed wetland loss on  
43 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation  
44 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to

1 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*  
2 *Biology Effects* discussion later in this section.

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

8 In spite of the managed wetland protection, restoration and avoidance measures contained in BDCP  
9 Alternative 1A, there would be a net reduction in the acreage of this special-status natural  
10 community in the near-term. This would be a significant impact when judged by the significance  
11 criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural  
12 tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent  
13 wetland and 8,850 acres of tidal freshwater emergent wetland) would eliminate this significant  
14 impact. Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that  
15 would improve management and enhance existing habitat values, further offsetting the impacts of  
16 managed wetland loss on covered and noncovered special-status terrestrial species and on common  
17 species that rely on this natural community for some life phase. As a result, there would be a less-  
18 than-significant impact.

### 19 **Late Long-Term Timeframe**

20 At the end of the Plan period, 12,813 acres of managed wetland natural community would be  
21 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would  
22 be restored. There would be a net permanent reduction in the acreage of this special-status natural  
23 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal  
24 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this  
25 managed wetland. Because these natural wetlands support similar ecological functions to those of  
26 managed wetland, there would be a less-than-significant impact.

### 27 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 28 **Managed Wetland Natural Community**

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

- 36 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A  
37 would result in an increase in the frequency and duration of inundation of 931-2,612 acres of  
38 managed wetland natural community. The methods used to estimate these inundation acreages  
39 are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The  
40 area more frequently affected by inundation would vary with the flow volume that would pass  
41 through the newly constructed notch in the Fremont Weir. The 931-acre increase in inundation  
42 would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the 2,612-acre  
43 increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow through

1 Fremont Weir would be expected in 30% of the years. Based on the theoretical modeling that  
2 has been completed to-date, the largest acreages would be associated with the Sacramento  
3 Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands south of  
4 Putah Creek. The anticipated change in management of flows in the Yolo Bypass includes more  
5 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some  
6 years, later releases into the bypass in spring months (April and May). With larger flows, the  
7 water depth may also increase over Existing Conditions. While the managed wetlands of the  
8 Yolo Bypass are conditioned to periodic inundation events, the more frequent and extended  
9 inundation periods may make it more difficult to actively manage the areas for maximum food  
10 production for certain species (waterfowl primarily) and may alter the plant assemblages in  
11 some years. The effects of the periodic inundation on birds and other terrestrial species are  
12 discussed later in this chapter. The additional inundation would not be expected to reduce the  
13 acreage of managed wetland on a permanent basis. The extended inundation would be designed  
14 to expand foraging and spawning habitat for Delta fishes.

- 15 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
16 increase in the frequency, magnitude and duration of inundation of an estimated 6 acres of  
17 managed wetland. Specific locations for this restoration activity have not been identified, but  
18 they would likely be focused in the south Delta area, along the major rivers and Delta channels.  
19 The connection of these wetlands to stream flooding events would be beneficial to the ecological  
20 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging  
21 activity and refuge sites would be expanded into areas currently unavailable or infrequently  
22 available to some aquatic species. The more frequent flooding would periodically interfere with  
23 management activities associated with terrestrial species (primarily waterfowl) and may result  
24 in changes in plant composition and management strategies over time.

25 In summary, 937–2618 acres of managed wetland community in the study area would be subjected  
26 to more frequent inundation as a result of implementing two Alternative 1A conservation measures  
27 (CM2 and CM5).

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

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

#### 41 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing** 42 **Operation, Maintenance and Management Activities**

43 Once the physical facilities associated with BDCP Alternative 1A are constructed and the stream flow  
44 regime associated with changed water management is in effect, there would be new ongoing and

1 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
2 conservation lands that could affect managed wetland natural community in the study area. The  
3 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced  
4 diversions from south Delta channels, and recreational use of reserve areas. These actions are  
5 associated with CM1 and CM11 (see the above impact discussion for effects associated with CM2).  
6 The periodic actions would involve access road and conveyance facility repair, vegetation  
7 management at the various water conveyance facilities and habitat restoration sites (CM11), levee  
8 repair and replacement of levee armoring, channel dredging, and habitat enhancement in  
9 accordance with natural community management plans. The potential effects of these actions are  
10 described below.

- 11 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
12 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
13 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
14 channels (associated with Operational Scenario A) would not result in the reduction in acreage  
15 of the managed wetland natural community in the study area. Flow levels in the upstream rivers  
16 would not change to the degree that water levels in adjacent managed wetlands would be  
17 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not  
18 result in a permanent reduction in the managed wetland community downstream of these  
19 diversions. The majority of the managed wetlands below the diversions is not directly connected  
20 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in  
21 this natural community.
- 22 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
23 conveyance facilities and levees associated with the BDCP actions have the potential to require  
24 removal of adjacent vegetation and could entail earth and rock work in managed wetland  
25 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
26 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff  
27 control management practices, including those developed as part of *AMM2 Construction Best*  
28 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
29 vegetation removal or earthwork adjacent to or within managed wetland habitats would require  
30 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.  
31 Proper implementation of these measures would avoid permanent adverse effects on this  
32 community.
- 33 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
34 treatment, would be a periodic activity associated with the long-term maintenance of water  
35 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
36 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
37 control nuisance vegetation could pose a long-term hazard to managed wetland natural  
38 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
39 herbicides, uncontrolled runoff of contaminated stormwater onto the community, or direct  
40 discharge of herbicides to managed wetland areas being treated for invasive species removal.  
41 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*  
42 have been made part of the BDCP to reduce hazards to humans and the environment from use of  
43 various chemicals during maintenance activities, including the use of herbicides. These  
44 commitments are described in Appendix 3B, including the commitment to prepare and  
45 implement spill prevention, containment, and countermeasure plans and stormwater pollution  
46 prevention plans. Best management practices, including control of drift and runoff from treated

1 areas, and use of herbicides approved for use in aquatic and terrestrial environments would also  
2 reduce the risk of affecting natural communities adjacent to water conveyance features and  
3 levees associated with restoration activities.

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

- 14 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
15 communities within the Plan Area (CM11). For the managed wetland natural community, a  
16 management plan would be prepared that specifies actions to improve the value of the habitats  
17 for covered species. Actions would include control of invasive nonnative plant and animal  
18 species, fire management, restrictions on vector control and application of herbicides, and  
19 maintenance of infrastructure that would allow for movement through the community. The  
20 enhancement efforts would improve the long-term value of this community for both special-  
21 status and common species.
- 22 • *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve  
23 areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
24 3.4.11) describes this program and identifies applicable restrictions on recreation that might  
25 adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization  
26 measure (AMM37) that further dictates limits on recreation activities that might affect this  
27 natural community. Hunting would be the dominant activity in fall and winter months, while  
28 fishing and hiking would be allowed in non-hunting months.

29 The various operations and maintenance activities described above could alter acreage of managed  
30 wetland natural community in the study area through facilities maintenance, vegetation  
31 management, and recreation. Activities could also introduce sediment and herbicides that would  
32 reduce the value of this community to common and sensitive plant and wildlife species. Other  
33 periodic activities associated with the Plan, including management, protection and enhancement  
34 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
35 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
36 community. While some of these activities could result in small changes in acreage, these changes  
37 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration* and  
38 protection and restoration actions associated with *CM3 Natural Communities Protection and*  
39 *Restoration*. Recreation activity effects would be minimized by AMM37 (BDCP Appendix 3.C). The  
40 management actions associated with levee repair and control of invasive plant species would also  
41 result in a long-term benefit to the species associated with managed wetland habitats by improving  
42 water movement.



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

5 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would  
6 have the potential to create minor changes in total acreage of managed wetland natural community  
7 in the study area, and could create temporary increases in turbidity and sedimentation. The  
8 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting  
9 could intermittently reduce the availability of this community to special-status and common wildlife  
10 species. Implementation of environmental commitments and AMM2, AMM4, AMM5 and AMM37  
11 would minimize these impacts, and other operations and maintenance activities, including  
12 management, protection and enhancement actions associated with *CM3 Natural Communities*  
13 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
14 create positive effects, including improved water movement in and adjacent to these habitats. Long-  
15 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal natural*  
16 *Communities Restoration*, and protection and restoration actions associated with *CM3 Natural*  
17 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural  
18 community in the study area. Ongoing operation, maintenance and management activities would not  
19 result in a net permanent reduction in this sensitive natural community within the study area.  
20 Therefore, there would be a less-than-significant impact on the natural community.

#### 21 **Other Natural Seasonal Wetland**

22 The other natural seasonal wetlands natural community encompasses all the remaining natural (not  
23 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.  
24 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area  
25 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils  
26 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area  
27 are located along the Cosumnes River northeast of Thornton, and in the western extension of the  
28 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh  
29 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are  
30 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure 12-  
31 1). The only Alternative 1A conservation component that would potentially affect this natural  
32 community is the seasonally inundated floodplain restoration conservation measure (CM5) (see  
33 Table 12-1A-10).

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

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

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

3

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

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

17 **NEPA Effects:** Alternative 1A conservation actions would not adversely affect other natural seasonal  
18 wetland natural community because the small increase in periodic flooding of up to 2 acres would  
19 not alter its function or general species makeup.

20 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study  
21 area would be subjected to more frequent inundation from flood flows as a result of implementing  
22 CM5 under Alternative 1A. This community would not be significantly impacted because a small  
23 increase in periodic flooding would not alter its ecological function or species composition. The

1 periodic inundation would not result in a net permanent reduction in the acreage of this community  
2 in the study area. Therefore, there would be no substantial adverse effect on the community. The  
3 impact would be less than significant.

#### 4 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from** 5 **Ongoing Operation, Maintenance and Management Activities**

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

- 16 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
17 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
18 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
19 channels (associated with Operational Scenario A) would not affect other natural seasonal  
20 wetland natural community. The small areas mapped in the study area are not in or adjacent to  
21 streams that would experience changes in water levels as a result of these operations.
- 22 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
23 conveyance facilities and levees associated with the BDCP actions have the potential to require  
24 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal  
25 wetland habitats. This activity could lead to increased soil erosion and runoff entering these  
26 habitats. These activities would be subject to normal erosion and runoff control management  
27 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
28 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or  
29 earthwork adjacent to or within other natural seasonal wetland habitats would require use of  
30 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*  
31 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would  
32 avoid permanent adverse effects on this community.
- 33 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
34 treatment, would be a periodic activity associated with the long-term maintenance of water  
35 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
36 associated with *CM11 Natural Communities Enhancement and Restoration*. Use of herbicides to  
37 control nuisance vegetation could pose a long-term hazard to the other natural seasonal wetland  
38 natural community at or adjacent to treated areas. The hazard could be created by uncontrolled  
39 drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural  
40 community, or direct discharge of herbicides to wetland areas being treated for invasive species  
41 removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the  
43 environment from use of various chemicals during maintenance activities, including the use of  
44 herbicides. These commitments are described in Appendix 3B, including the commitment to  
45 prepare and implement spill prevention, containment, and countermeasure plans and

1 stormwater pollution prevention plans. Best management practices, including control of drift  
2 and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic  
3 environments would also reduce the risk of affecting natural communities adjacent to water  
4 conveyance features and levees associated with restoration activities.

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

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

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

30 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would  
31 have the potential to create minor changes in total acreage of other natural seasonal wetland natural  
32 community in the study area, and could create temporary increases in sedimentation. The activities  
33 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of  
34 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,  
35 and other operations and maintenance activities, including management, protection and  
36 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
37 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
38 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration  
39 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and  
40 protection actions associated with *CM3 Natural Communities Protection and Restoration* would  
41 ensure that the ecological values provided by this small natural community would not decrease in  
42 the study area. Ongoing operation, maintenance and management activities would not result in a net  
43 permanent reduction in this natural community within the study area. Therefore, there would be a  
44 less-than-significant impact.

1       **Grassland**

2       Construction, operation, maintenance and management associated with the conservation  
3       components of Alternative 1A would have no long-term adverse effects on the habitats associated  
4       with the grassland natural community. Initial development and construction of CM1, CM2, CM4,  
5       CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this  
6       community(see Table 12-1A-11). Full implementation of Alternative 1A would also include the  
7       following conservation actions over the term of the BDCP to benefit the grassland natural  
8       community.

- 9       ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in Conservation  
10       Zone 1, at least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected  
11       in Conservation Zone 11 (Objective GNC1.1, associated with CM3)
- 12       ● Restore at least 2,000 acres of grasslands to connect fragmented patches of protected grassland  
13       and to provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for  
14       wildlife foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8)
- 15       ● Of the at least 8,000 acres of grassland protected and at least 2,000 acres of grassland restored,  
16       protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide  
17       at least 200 feet of adjacent grasslands beyond the sea level rise accommodation (Objective  
18       GNC1.4, associated with CM3 and CM8)

19       There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
20       3.3 that would improve the value of grassland natural community for terrestrial species. As  
21       explained below, with the protection, restoration and enhancement of the amounts of habitat listed  
22       in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community  
23       would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	315	315	262	262	0	0
CM2	388	388	239	239	385-1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	34	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>1,203</b>	<b>2,371</b>	<b>501</b>	<b>535</b>	<b>385-1,277</b>	<b>514</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

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

5 Construction, land grading and habitat restoration activities that would accompany the  
6 implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would permanently eliminate  
7 an estimated 2,371 acres and temporarily remove 535 acres of grassland natural community in the  
8 study area. These modifications represent approximately 4% of the 78,047 acres of the community  
9 that is mapped in the study area. Approximately 60% of the permanent and temporary losses would  
10 occur during the first 10 years of Alternative 1A implementation, as water conveyance facilities are  
11 constructed and habitat restoration is initiated. Grassland protection (2,000 acres), restoration  
12 (1,140 acres) and enhancement would be initiated during the same period. By the end of the Plan  
13 period, 2,000 acres of this natural community would be restored and 8,000 acres would be  
14 protected. The BDCP beneficial effects analysis for grassland (BDCP Chapter 5, Section 5.4.11.2)  
15 indicates that at least 8,000 acres of grasslands would be protected in Conservation Zones 1, 2, 4, 5,  
16 7, 8, and 11, and 2,000 acres of grassland would be restored. Grassland protection and restoration  
17 would improve connectivity among habitat areas in and adjacent to the Plan Area, improve genetic  
18 interchange among native species' populations, and contribute to the long-term conservation of  
19 grassland-associated covered species. These same conservation activities would occur through  
20 implementation of Alternative 1A.

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

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance  
5 facilities would permanently remove 315 acres and temporarily remove 262 acres of grassland  
6 natural community. Most of the permanent loss would occur where Intakes 1–5 encroach on the  
7 Sacramento River’s east bank between Freeport and Courtland, at various locations along the  
8 north-south transmission line corridor, and at the southern forebay adjacent to Clifton Court  
9 Forebay. The ruderal and herbaceous grassland areas along the Sacramento River are very  
10 narrow bands adjacent to the road and the levee that borders the river (see Terrestrial Biology  
11 Mapbook). The grassland lost at the southern forebay and the adjacent spoils storage area is  
12 composed of larger stands of ruderal and herbaceous vegetation and California annual  
13 grassland. A smaller acreage of permanent loss would occur at an RTM storage site on Andrus  
14 Island, and at the northern forebay just west of Stone Lake. The temporary losses would be  
15 associated with construction of the pump stations along the Sacramento River, pipelines  
16 connecting the intakes with the northern forebay, and work associated with barge offloading  
17 facility construction. The temporary pipeline construction losses would be located in the vicinity  
18 of Hood and along Snodgrass Slough. The temporary barge unloading facility impacts would  
19 occur along Middle River at Bacon Island, and along North Victoria Canal between Woodward  
20 and Victoria Islands. These losses would take place during the near-term construction period.
- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
22 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
23 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and  
24 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could  
25 involve excavation and grading in grassland areas to improve passage of fish through the  
26 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be  
27 permanently lost and another 239 acres could be temporarily removed. Most of the grassland  
28 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of  
29 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These  
30 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland  
31 removal along the side channels of the bypass could pose barriers to grassland species moving  
32 within the bypass. These losses would occur primarily in the near-term timeframe.
- 33 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
34 footprints, implementation of CM4 would permanently inundate or remove 448 acres of  
35 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the  
36 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration  
37 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on  
38 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
39 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal and  
40 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the  
41 Cache Slough ROA are annual grassland with higher values.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
43 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural  
44 community. The construction-related losses would be considered a permanent removal of the  
45 habitats directly affected. These losses would be expected to occur along the San Joaquin River  
46 and other major waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily

1 composed of narrow bands and small patches of ruderal herbaceous grasses and forbs. This  
2 activity is scheduled to start following construction of water conveyance facilities, which is  
3 expected to take 10 years.

- 4 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
5 removal of small amounts of grassland natural community along 20 miles of river and sloughs.  
6 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
7 activity would occur along waterway margins where grassland habitat stringers exist, including  
8 along levees and channel banks. The improvements would occur within the study area on  
9 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter  
10 Sloughs.
- 11 ● *CM7 Riparian Natural Community Restoration*; Riparian natural community restoration would  
12 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of  
13 existing riparian areas and stream/river corridors, to benefit the movement and interchange of  
14 special-status and common species that use these areas. Large tracts would be restored in  
15 concert with floodplain restoration (CM5), while narrower bands would be developed as part of  
16 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of  
17 expanding woody riparian habitat, existing nonnative grassland would be removed. While  
18 specific locations for these restoration activities have not been fully developed, use of  
19 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost  
20 through the course of Alternative 1A implementation. A majority of this activity would occur in  
21 the South Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).
- 22 ● *CM8 Grassland Natural Community Restoration*: The grassland natural community would be  
23 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and  
24 agricultural lands. Restoration would focus on CZs 1, 8, and 11, as proposed by BDCP Objective  
25 GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the diversity  
26 of grassland species (Objective GNC1.2). Some of the planned 2,000 acres of restoration would  
27 occur around existing populations of giant garter snake in the east Delta and the Yolo Bypass  
28 area.
- 29 ● *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement  
30 and management would include a wide range of activities designed to improve habitat  
31 conditions in restored and protected lands associated with the BDCP. This measure also  
32 promotes sound use of pesticides, vector control activities, invasive species control and fire  
33 management in preserve areas. To improve the public's ability to participate in recreational  
34 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The  
35 location and extent of this system are not yet known, so the analysis of this activity is  
36 programmatic. At the current level of planning, it is assumed that the trail system would be  
37 located entirely in grassland habitats and would include up to 50 acres of habitat loss.
- 38 ● *CM18. Conservation Hatcheries*: The BDCP includes a proposal to design and construct a  
39 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of  
40 this facility is not yet firmly established, but for planning purposes it has been assumed that it  
41 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The  
42 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous  
43 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.



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

4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would  
6 affect the grassland natural community through CM1 construction losses (315 acres permanent and  
7 262 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),  
8 CM11 recreational trail construction (13 acres permanent), CM18 fish hatchery construction (35  
9 acres permanent), and CM7 riparian habitat restoration (4 acres permanent). These losses would  
10 occur primarily along the eastern bank of the Sacramento River at intake sites, along pipeline routes  
11 connecting these intakes to the northern forebay, at various locations along the north-south  
12 transmission line corridor, at the southern forebay, at currently unspecified sites for hatchery and  
13 recreational trail construction and riparian restoration, in the northern Yolo Bypass, and along the  
14 east and west channels within the Yolo Bypass. Approximately 488 acres of the inundation and  
15 construction-related losses in habitat from CM4 would occur in the near-term. These losses would  
16 occur throughout the ROAs mapped in Figure 12-1.

17 The construction losses of this natural community would not represent an adverse effect based on  
18 the significance criteria used for this chapter because grassland is not considered a special-status or  
19 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual  
20 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of  
21 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*  
22 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in  
23 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and  
24 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of  
25 Alternative 1A implementation, and the commitment to restore temporarily affected grassland (501  
26 acres) to its pre-project condition within 1 year of completing construction as required by *AMM10*  
27 *Restoration of Temporarily Affected Natural Communities*, would offset this near-term loss, avoiding  
28 any loss in the value of this habitat for special-status species. The restoration of grassland would  
29 include protection in perpetuity, and the protected and restored habitat would be managed and  
30 enhanced to benefit special-status and common wildlife species (CM3 and CM11). Typical project-  
31 level mitigation ratios (2:1 for protection) would indicate that 3,408 acres of protection would be  
32 needed to offset (i.e., mitigate) the 1,704 acres of combined temporary and permanent loss. The  
33 combination of restoration and protection, along with the enhancement and management associated  
34 with CM3 and CM11 and the restoration of temporarily affected habitat (AMM10) contained in the  
35 BDCP is designed to avoid a temporal lag in the value of grassland habitat available to sensitive  
36 species.

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

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1A as a whole would result in less than 4% losses of grassland  
3 natural community in the study area. These losses (2,371 acres of permanent and 535 acres of  
4 temporary loss) would be largely associated with construction of the water conveyance facilities  
5 (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal marsh  
6 restoration (CM4), and riparian habitat restoration (CM7). Inundation losses would occur through  
7 the course of BDCP restoration activities at various tidal restoration sites throughout the study area.

8 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community  
9 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur  
10 primarily in CZ 1, CZ 8, and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay  
11 areas. Temporarily affected grassland would also be restored following construction activity. The  
12 2,000 acres of restoration associated with CM8, and the restoration of temporarily affected  
13 grassland required by AMM10 (535 acres for Alternative 1A) would not totally replace the grassland  
14 acres lost through the Plan timeframe (2,856 acres). There would be a permanent loss of 321 acres  
15 of grassland in the study area. However, the combination of restoration, protection and  
16 enhancement of grassland associated with Alternative 1A would improve the habitat value of this  
17 community in the study area; there would not be an adverse effect on the grassland natural  
18 community.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Alternative 1A would result in the loss of approximately 1,704 acres of grassland natural community  
22 due to construction of the water conveyance facilities (CM1), fish passage improvements (CM2),  
23 inundation during tidal marsh restoration (CM4), recreational trail construction (CM11), riparian  
24 habitat restoration (CM7), and fish hatchery construction (CM18). This total includes both  
25 permanent and temporary near-term losses listed in Table 12-1A-11. The construction losses would  
26 occur primarily along the Sacramento River at intake sites, along pipeline routes connecting these  
27 intakes to the northern forebay, at the southern forebay, at currently unspecified sites for hatchery  
28 and recreational trail construction and riparian restoration, and within the northern section of the  
29 Yolo Bypass, while inundation losses would occur at various tidal restoration sites throughout the  
30 study area. The construction losses would be spread across a 10-year near-term timeframe.

31 The construction losses of this natural community would not represent a significant impact based  
32 on the significance criteria used for this chapter because grassland is not considered a special-status  
33 or sensitive natural community. Nonetheless, these losses would be offset by planned restoration of  
34 1,140 acres, and protection of 2,000 acres of grassland natural community scheduled for the first 10  
35 years of Alternative 1A implementation, and the restoration of temporarily affected grassland (501  
36 acres for Alternative 1A) as dictated by AMM10. Also, AMM1, AMM2, AMM6, and AMM7 would be  
37 implemented to minimize impacts. Because of these offsetting near-term restoration and protection  
38 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios  
39 (2:1 for protection) would indicate that 3,408 acres of protection would be needed to offset (i.e.,  
40 mitigate) the 1,704 acres of loss. The combination of two approaches (protection and restoration)  
41 contained in the BDCP conservation measures and avoidance and minimization measures are  
42 designed to avoid a temporal lag in the value of grassland habitat available to special-status species.  
43 The protection and restoration would be initiated at the beginning of Alternative 1A implementation  
44 to minimize any time lag in the availability of this habitat to special-status species.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 2,906 acres of grassland natural community would be permanently or  
3 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would  
4 be protected. Temporarily affected areas would also be restored (535 acres for Alternative 1A).  
5 While there would be a net permanent reduction in the acreage of this natural community within  
6 the study area (total loss of 321 acres), there would be an increase in the value of grassland for  
7 special-status and common species in the study area through the combination of conservation  
8 actions (CM3 and CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7,  
9 and AMM10). Therefore, Alternative 4 would have a less-than-significant impact on this natural  
10 community.

11 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
12 **Grassland Natural Community**

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

- 19 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A  
20 would result in an increase in the frequency, magnitude and duration of inundation of 385–  
21 1,277 acres of grassland natural community. The methods used to estimate this inundation  
22 acreage are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*.  
23 The area more frequently affected by inundation would vary with the flow volume that would  
24 pass through the newly constructed notch in the Fremont Weir. The 385-acre increase in  
25 inundation would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur  
26 at the 4,000 cfs flow regime. Plan-related increases in flow through Fremont Weir would be  
27 expected in 30% of the years. The grassland community occurs throughout the bypass, including  
28 a large acreage just below Fremont Weir in the north end of the bypass, in stringers along the  
29 internal waterways of the bypass and in larger patches in the lower bypass. The anticipated  
30 change in management of flows in the Yolo Bypass includes more frequent releases in flows into  
31 the bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the  
32 bypass in spring months (April and May). The modification of periodic inundation events would  
33 not adversely affect grassland habitats, as they have persisted under similar high flows and  
34 extended inundation periods. There is the potential for some change in grass species  
35 composition as a result of longer inundation periods. The effects of this inundation on wildlife  
36 and plant species are described in detail in later sections of this chapter.
- 37 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
38 increase in the frequency and duration of inundation of 514 acres of grassland habitats. Specific  
39 locations for this restoration activity have not been identified, but they would likely be focused  
40 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The  
41 increase in periodic stream flooding events would not adversely affect the habitat values and  
42 functions of grassland natural community.

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

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

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

#### 15 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,** 16 **Maintenance and Management Activities**

17 Once the physical facilities associated with BDCP Alternative 1A are constructed and the stream flow  
18 regime associated with changed water management is in effect, there would be new ongoing and  
19 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
20 conservation lands that could affect grassland natural community in the study area. The ongoing  
21 actions include changes in releases from upstream reservoirs, the diversion of Sacramento River  
22 flows in the north Delta, and reduced diversions from south Delta channels. These actions are  
23 associated with CM1 (see Impact BIO-30 for effects associated with CM2). The periodic actions  
24 would involve access road and conveyance facility repair, vegetation management at the various  
25 water conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of  
26 levee armoring, channel dredging, and habitat enhancement in accordance with natural community  
27 management plans. The potential effects of these actions are described below.

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

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

42      The various operations and maintenance activities described above could alter acreage of grassland  
43      natural community in the study area through changes in flow patterns and changes in periodic  
44      inundation of this community. Activities could also introduce sediment and herbicides that would  
45      reduce the value of this community to common and sensitive plant and wildlife species. Other  
46      periodic activities associated with the Plan, including management, protection and enhancement

1 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
2 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
3 community. While some of these activities could result in small changes in acreage, these changes  
4 would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*  
5 *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The  
6 management actions associated with levee repair, periodic dredging and control of invasive plant  
7 species would also result in a long-term benefit to the species associated with grassland habitats by  
8 improving water movement in adjacent waterways and by eliminating competitive, invasive species  
9 of plants.

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

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

### 27 **Inland Dune Scrub**

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

### 34 **Cultivated Lands**

35 Cultivated lands is the major land-cover type in the study area (487,106 acres; see Table 12-1). The  
36 Delta, the Yolo Bypass, and the Cache Slough drainage are dominated by various types of agricultural  
37 activities, with crop production the dominant element (see Figure 12-1). Major crops and cover  
38 types in agricultural production include grain and hay crops (wheat, oats and barley), field crops  
39 (corn, beans and safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native  
40 and nonnative pasture), rice, orchards, and vineyards. Tables 12-2 and 12-3 list special-status plant  
41 and wildlife species supported by cultivated lands.

42 The effects of Alternative 1A on cultivated lands are discussed from various perspectives in this  
43 document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as

1 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and  
 2 wildlife species later in this chapter also focus on the relevance of cultivated land loss. Because  
 3 cultivated lands is not a natural community and because the effects of its loss are captured in the  
 4 individual species analyses below, there is no separate analysis of this land cover type presented  
 5 here. Table 14-8 in Chapter 14 provides a comparison of important farmland losses that would  
 6 result from construction of CM1 water conveyance facilities for each alternative, and Table 14A-1 in  
 7 Appendix 14A, *Individual Crop Effects as a Result of BDCP Water Conveyance Facility Construction*,  
 8 provides a similar comparison for losses of individual crops. Table 12-ES-1 in this chapter's  
 9 Summary of Effects identifies the total cultivated land loss for all project alternatives. For  
 10 Alternative 1A, the total loss (temporary and permanent) is estimated to be 58,369 acres. The  
 11 majority of the permanent loss would be associated with habitat restoration activities, including  
 12 Yolo Bypass fisheries enhancement (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres),  
 13 floodplain restoration (CM5; 2,087 acres), riparian natural community restoration (CM7; 960 acres),  
 14 grassland restoration (CM8; 2,000 acres) and nontidal marsh restoration (CM10; 1,950 acres).  
 15 Construction of the tunnel and associated water conveyance facilities (CM1) would permanently  
 16 remove 3,836 acres of cultivated land.

17 **Developed Lands**

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

29 **Wildlife Species**

30 **Vernal Pool Crustaceans**

31 This section describes the effects of Alternative 1A, including water conveyance facilities  
 32 construction and implementation of other conservation components, on vernal pool crustaceans  
 33 (California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp,  
 34 vernal pool fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects  
 35 for the vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and  
 36 uplands that display characteristic vernal pool and swale visual signatures that have not been  
 37 significantly affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and  
 38 degraded vernal pool complex, which consists of low-value ephemeral habitat ranging from areas  
 39 with vernal pool and swale visual signatures that display clear evidence of significant disturbance  
 40 due to plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural  
 41 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the  
 42 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and  
 43 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands  
 44 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included

1 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that  
2 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool  
3 plants. These areas do not include topographic depressions that are characteristic of vernal pool  
4 crustacean habitat and, thus, are considered to have a lower value for the species.

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

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

23 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
24 AMMs to minimize potential effects, impacts on vernal pool crustaceans would not be adverse for  
25 NEPA purposes and would be less than significant for CEQA purposes.



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

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	1	1	0	0	NA	NA
	Low-value	2	2	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>204</b>	<b>375</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

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

6 Alternative 1A conservation measures would result in the direct, permanent loss of up to 375 acres  
 7 of modeled vernal pool crustacean habitat from conveyance facilities construction (CM1) and tidal  
 8 restoration (CM4). In addition, the conservation measures could result in the indirect conversion  
 9 due to hydrologic changes of an additional 142 acres of vernal pool crustacean habitat (91 acres of  
 10 high-value habitat and 51 acres of low-value habitat) from conveyance facilities construction (CM1)  
 11 and based on the hypothetical footprints for tidal restoration (CM4). Construction of the water  
 12 conveyance facilities and restoration activities may result in the modification of hardpan and  
 13 changes to the perched water table, which could lead to alterations in the rate, extent, and duration  
 14 of inundation of nearby vernal pool crustacean habitat. USFWS typically considers construction  
 15 within 250 feet of vernal pool crustacean habitat to constitute a possible conversion of crustacean  
 16 habitat unless more detailed information is provided to further refine the limits of any such effects.  
 17 For the purposes of this analysis, the 250-foot buffer was applied to the water conveyance facilities  
 18 work areas where surface and subsurface disturbance activities would take place and to restoration  
 19 hypothetical footprints. Habitat enhancement and management activities (CM11), which include  
 20 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

21 Alternative 1A would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
 22 acres), vernal pool fairy shrimp (270 acres), and vernal pool tadpole shrimp (270 acres). The  
 23 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of the effects on critical

1 habitat for these species. *AMM12 Vernal Pool Crustaceans* would ensure that there would be no  
2 adverse modification of the primary constituent elements of critical habitat for these species.

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

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

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
22 result in the permanent loss of 3 acres of vernal pool crustacean habitat, composed of 1 acre of  
23 high-value and 2 acres of low-value habitat (Table 12-1A-12). In addition, conveyance facility  
24 construction could result in the indirect conversion of 8 acres of modeled vernal pool crustacean  
25 habitat in the vicinity of Clifton Court Forebay. The affected area consists of 2 acres of high-value  
26 and 6 acres low-value habitat. There are no records of listed vernal pool crustaceans at these  
27 locations but there are records for vernal pool fairy shrimp and midvalley fairy shrimp in the  
28 vicinity of these areas (California Department of Fish and Wildlife 2013).
- 29 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
30 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,  
31 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool  
32 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale  
33 visual signatures that display clear evidence of significant disturbance due to plowing, disking,  
34 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions  
35 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
36 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery  
37 found that these habitats appear to generally have low densities. However, areas mapped as  
38 degraded vernal pool complex may still provide habitat for vernal pool crustaceans as evidenced  
39 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella  
40 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Wildlife  
41 2013). Helm (1998) notes that many vernal pool crustaceans can occur in degraded vernal pool  
42 habitats and artificial habitats. In CZs 2 and 4, there are several records of covered vernal pool  
43 crustaceans occurring outside of modeled habitat in areas that appear to be road side ditches. So  
44 though degraded vernal pool complexes may not represent botanically diverse vernal pools they  
45 still can provide habitat for vernal pool crustaceans and thus the loss of 372 acres of degraded

1 vernal pool complex may result in the loss of occupied vernal pool crustacean habitat. In  
2 addition, tidal restoration could result in the indirect conversion of 135 acres of vernal pool  
3 crustacean habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat.  
4 The hypothetical restoration footprints overlap with a CNDDDB record for vernal pool fairy  
5 shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under  
6 Alternative 1A would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
7 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres).  
8 *AMM12 Vernal Pool Crustaceans* would ensure that there would be no adverse modification of  
9 the primary constituent elements of critical habitat for these species.

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

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
23 also included. Table 12-1A-13 was prepared to further analyze Alternative 1A effects on vernal pool  
24 crustaceans using wetted acres of vernal pools in order to compare the effects of this alternative  
25 with the effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*,  
26 which are measured in wetted acres of vernal pools. Wetted acres were estimated by using the  
27 BDCP's assumption that restored vernal pool complexes would have a 15% density of vernal pools  
28 (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal pools and the remaining  
29 85 acres supporting uplands). Based on an informal evaluation of aerial photographs of the Plan  
30 Area it is likely that the actual densities within the Plan Area are approximately 10%, but the 15%  
31 density value was chosen as a conservative estimate for determining effects.

1 **Table 12-1A-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 1A**  
2 **(acres)**

	Direct Loss		Indirect Conversion	
	Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>	5	10	10	20
Alternative 1A Impact <sup>b</sup>	CM1	0.5	1.2	1.2
	CM4 <sup>c</sup>	30.2	55.8	11.0
<b>Total</b>	<b>30.7</b>	<b>56.3</b>	<b>12.2</b>	<b>21.5</b>

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

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

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

3

4 ***Near-Term Timeframe***

5 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the  
6 near-term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
8 effects of such conveyance facility construction would not be adverse under NEPA and would be less  
9 than significant under CEQA. Table 12-1A-12 above lists the impacts on modeled vernal pool  
10 crustacean habitat that is based on the natural community mapping done within the study area. The  
11 impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints and  
12 do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's commitment  
13 to design restoration projects to minimize or avoid effects on covered vernal pool crustaceans. As  
14 seen in Table 12-1A-13, the effects of CM1 alone would be well within the near-term limits. As seen  
15 in Table 12-1A-13, Alternative 1A would not meet the Plan's near-term biological goals and  
16 objectives for direct loss and indirect conversion unless near-term tidal restoration projects are  
17 designed to ensure that they do not exceed these impact limits.

18 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
19 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
20 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.5  
21 wetted acre of vernal pool crustacean habitat (or 3 acres of complex using the 15% density) should  
22 be restored and 3.4 acres (or 23 acres of complex) protected to mitigate the CM1 direct and indirect  
23 effects on vernal pool crustacean habitat. Assuming that the BDCP would apply the impact limits  
24 presented in Table 12-1A-13, impacts on wetted vernal pool crustacean habitat resulting from tidal  
25 restoration in the near-term could not exceed 4.5 wetted acres direct and 8.8 wetted acres indirect.  
26 The impacts based on the hypothetical tidal restoration footprints would exceed these limits. When  
27 and if these limits are met, the BDCP would need to restore up to 5 wetted acres (33 acres of  
28 complex) and protect up to 30 wetted acres (200 acres of complex) in the near-term to offset the  
29 effects of CM1 and CM4.

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

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

12 The species-specific biological goals and objectives would also inform the near-term protection and  
13 restoration efforts. These Plan goals represent performance standards for considering the  
14 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
15 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean  
16 habitat.

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

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

26 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
27 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
28 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1A-13, the effects of CM1 alone  
29 would be well within the near-term limits but overall Alternative 1A would not meet the Plan's late  
30 long-term biological goals and objectives for direct and indirect effects unless tidal restoration  
31 projects are designed to ensure that they do not exceed these impact limits.

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

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

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

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

7 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 1A would not  
8 be adverse because the BDCP has committed to avoiding and minimizing effects from tidal  
9 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation  
10 ratios described above. In the absence of other conservation actions, the modification of vernal pool  
11 crustacean habitat and potential mortality of special-status species resulting from Alternative 1A in  
12 the late long-term would represent an adverse effect. However, the BDCP has committed to impact  
13 limits for vernal pool crustacean habitat and to habitat protection, restoration, management, and  
14 enhancement associated with CM3, CM9, and CM11. This habitat protection, restoration,  
15 management and enhancement would be guided by species-specific goals and objectives and by  
16 AMM1-AMM6, AMM10, AMM12, and AMM37, which would be in place throughout the time period  
17 of construction. Considering these commitments, losses and conversion of vernal pool crustacean  
18 habitat under Alternative 1A would not be an adverse effect.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the  
22 near-term Alternative 1A conservation strategy has been evaluated to determine whether it would  
23 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
24 the impacts of construction would be less than significant. Table 12-1A-12 above lists the impacts on  
25 modeled vernal pool crustacean habitat that is based on the natural community mapping done  
26 within the study area. The impacts from tidal natural communities restoration (CM4) are based on  
27 hypothetical footprints and do not reflect actual impacts on vernal pool crustacean habitat  
28 considering the BDCP's commitment to design restoration projects to minimize or avoid effects on  
29 covered vernal pool crustaceans. As seen in Table 12-1A-13, the effects of CM1 alone would be well  
30 within the near-term limits. As seen in Table 12-1A-13, Alternative 1A would not meet the Plan's  
31 near-term biological goals and objectives for direct and indirect effects unless near-term tidal  
32 restoration projects are designed to ensure that they do not exceed these impact limits.

33 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
34 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
35 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.5  
36 wetted acre of vernal pool crustacean habitat (or 3 acres of vernal pool complex using the 15%  
37 density) should be restored and 3.4 acres (or 23 acres of vernal pool complex) protected to mitigate  
38 the CM1 direct and indirect effects on vernal pool crustacean habitat. Assuming that the BDCP would  
39 apply the impact limits presented in Table 12-1A-13, impacts on wetted vernal pools resulting from  
40 tidal restoration in the near-term could not exceed 4.5 wetted acres direct and 8.8 wetted acres  
41 indirect. The impacts based on the hypothetical tidal restoration footprints would exceed these  
42 limits. When and if these limits are met, the BDCP would need to restore up to 5 wetted acres (33  
43 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool complex)  
44 in the near-term to offset the effects of CM1 and CM4.

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

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

12 The species-specific biological goals and objectives would also inform the near-term protection and  
13 restoration efforts. These Plan goals represent performance standards for considering the  
14 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
15 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean  
16 habitat.

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

25 The natural community restoration and protection activities are expected to be concluded in the  
26 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on  
27 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with  
28 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion  
29 that the near-term effects of Alternative 1A would be less than significant under CEQA.

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

31 Based on modeled habitat, the study area supports approximately 11,040 acres of vernal pool. The  
32 BDCP states that covered activities would not result in more than 10 wetted acres of direct loss and  
33 no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-term  
34 (see Objective VPNC1.2 and AMM12). As seen in Table 12-1A-13, the effects of CM1 alone would be  
35 well within the near-term limits but overall Alternative 1A would not meet the Plan's late long-term  
36 biological goals and objectives for direct and indirect effects unless tidal restoration projects are  
37 designed to ensure that they do not exceed these impact limits.

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

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

- 3 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 4 • Protecting the range of inundation characteristics that are currently represented by vernal pool  
5 throughout the Plan Area (Objective VPNC1.4).
- 6 • Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective  
7 VPC1.1).

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

12 In the absence of other conservation actions, the effects on vernal pool crustacean habitat from  
13 Alternative 1A would represent an adverse effect as a result of habitat modification of a special-  
14 status species and potential for direct mortality. However, the BDCP has committed to impact limits  
15 for vernal pool crustacean habitat and to the habitat protection, restoration, management, and  
16 enhancement associated with CM3, CM9, and CM11. These conservation activities would be guided  
17 by species-specific goals and objectives, and by AMM1-AMM6, AMM10, AMM12, and AMM37, which  
18 would be in place throughout the time period of construction. Considering these commitments,  
19 Alternative 1A over the term of the BDCP would not result in a substantial adverse effect through  
20 habitat modifications and would not substantially reduce the number or restrict the range of vernal  
21 pool crustaceans. Therefore, Alternative 1A would have a less-than-significant impact on vernal pool  
22 crustaceans.

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

24 Construction and maintenance activities associated with water conveyance facilities, and restoration  
25 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of  
26 construction and restoration areas, and maintenance activities. These potential effects would be  
27 minimized or avoided through AMM1-AMM6, AMM10, and AMM12, which would be in effect  
28 throughout the Plan's construction phase.

29 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
30 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-  
31 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could  
32 result in the inadvertent release of sediment and hazardous substances into this habitat. These  
33 potential effects would be avoided and minimized through AMM1-AMM6, which would be in effect  
34 throughout the Plan's construction phase. Vernal pool crustaceans and their habitat could be  
35 periodically indirectly affected by maintenance activities at water conveyance facilities.

36 Embankment maintenance activities around Clifton Court Forebay could result in the inadvertent  
37 discharge of sediments and hazardous materials into vernal pool crustacean habitat that occurs  
38 along the southern and western boundaries of the forebays. These potential effects would be  
39 avoided and minimized through AMM1-AMM6, which would be in effect throughout the term of the  
40 Plan. The indirect effects of Alternative 1A implementation would not be adverse

41 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
42 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in



1 the vicinity of construction and restoration areas, and maintenance activities. These potential  
2 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would  
3 be in effect throughout the Plan’s construction phase. The indirect impacts of Alternative 1A would  
4 be less than significant.

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

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

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

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

31 **Valley Elderberry Longhorn Beetle**

32 This section describes the effects of Alternative 1A, including water conveyance facilities  
33 construction and implementation of other conservation measures, on the valley elderberry longhorn  
34 beetle. That habitat model used to assess the effects for valley elderberry longhorn beetle is based  
35 on riparian habitat and nonriparian habitat (vernal pool complexes and grasslands within 200 feet  
36 of channels). Construction and restoration associated with Alternative 1A conservation measures  
37 would result in both temporary and permanent losses of valley elderberry longhorn beetle modeled  
38 habitat as indicated in Table 12-1A-14. The majority of the losses would take place over an extended  
39 period of time as the restoration conservation measures are being implemented. In addition, an  
40 estimated 21 elderberry shrubs could be impacted by Alternative 1A conveyance alignment (CM1).  
41 Full implementation of Alternative 1A would also include the following conservation actions over  
42 the term of the BDCP to benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation*  
43 *Strategy*).

- 1 • Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the  
2 species (Objective VELB1.1).
- 3 • Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective  
4 VELB1.2).
- 5 • Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7).
- 6 • Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3).
- 7 • Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,  
8 such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with  
9 CM7 and CM11).

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

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

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	58	58	28	28	NA	NA
	Non-riparian	192	192	73	73	NA	NA
<b>Total Impacts CM1</b>		<b>250</b>	<b>250</b>	<b>101</b>	<b>101</b>		
CM2–CM18	Riparian	381	678	76	111	44–80	266
	Non-riparian	142	311	94	108	103–244	287
<b>Total Impacts CM2–CM18</b>		<b>523</b>	<b>989</b>	<b>170</b>	<b>219</b>	<b>161–325</b>	<b>553</b>
<b>TOTAL IMPACTS</b>		<b>773</b>	<b>1,240</b>	<b>271</b>	<b>320</b>	<b>161–325</b>	<b>553</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

15

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

17 Alternative 1A conservation measures would result in the permanent and temporary loss combined  
18 of up to 1,560 acres of modeled valley elderberry longhorn beetle habitat (875 acres of riparian  
19 habitat and 685 acres of nonriparian habitat), and an estimated 21 elderberry shrubs from CM1,  
20 which represent potential habitat for the species (Table 12-1A-14). Due to the limitation of the  
21 habitat suitability model, all of these effects are assumed to be a large overestimate of the true effect

1 on potential valley elderberry longhorn beetle habitat. Conservation measures that would result in  
2 these losses are conveyance facilities and transmission line construction, and establishment and use  
3 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat  
4 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
5 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could  
6 result in local adverse habitat effects. In addition, maintenance activities associated with the long-  
7 term operation of the water conveyance facilities and other BDCP physical facilities could degrade  
8 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term  
9 habitat protection and restoration contained in the Plan and implementation of AMMs committed to  
10 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under  
11 CEQA. Each of these activities is described below.

- 12 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
13 result in the permanent and temporary combined loss of approximately 351 acres of modeled  
14 valley elderberry longhorn beetle habitat, composed of 86 acres of riparian habitat and 265  
15 acres of nonriparian habitat (Table 12-1A-14). In addition, an estimated 21 shrubs could be  
16 potentially removed as a result of conveyance facility construction. The exact number of shrubs  
17 to be impacted will be determined during pre-construction surveys of the footprints of the  
18 conveyance facility and associated work areas. Most of these impacts are associated with the  
19 intake and forebay construction in the north delta. There are no records of valley elderberry  
20 longhorn beetle within these impact areas. The portion of the above impacts that result from  
21 temporary habitat loss includes 101 acres of modeled valley elderberry longhorn beetle habitat  
22 (28 acres riparian and 73 acres nonriparian habitat). Elderberry shrubs could be affected from  
23 ground-disturbing activities associated with conveyance construction footprints, temporary  
24 access roads, and staging areas.
- 25 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries  
26 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
27 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159  
28 acres of riparian habitat and 135 acres of nonriparian habitat. Approximately 125 acres of  
29 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the  
30 north end of the Yolo Bypass from Fremont Weir improvements. The 224 acres of temporary  
31 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the  
32 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be  
33 affected from ground-disturbing activities associated with the re-contouring of surface  
34 topography, excavation or modification of channels, levee modification, and removal of riprap  
35 and other protections from channel banks.
- 36 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
37 in the permanent loss of approximately 813 acres of modeled valley elderberry longhorn beetle  
38 habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The majority of  
39 these impacts would be associated with tidal restoration in the Delta and only 42 acres of these  
40 impacts (all nonriparian) would be from tidal restoration in Suisun Marsh. Elderberry shrubs  
41 could be affected from ground-disturbing activities associated with the re-contouring of surface  
42 topography, excavation or modification of channels, type conversion from riparian and  
43 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other  
44 protections from channel banks.
- 45 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
46 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of

1 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of  
2 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be  
3 permanent impacts from levee construction and the other half (49 acres) would be temporary  
4 impacts associated with the levee construction. There is one record of valley elderberry  
5 longhorn beetle occurring in CZ 7 just west of Middle River on Union Island. This record and  
6 other elderberry shrubs could be affected from ground-disturbing activities associated with the  
7 re-contouring of surface topography, excavation or modification of channels, levee removal and  
8 modification, and removal of riprap and other protections from channel banks.

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

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

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

26 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the  
27 near-term BDCP conservation strategy has been evaluated to determine whether it would provide  
28 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
29 effects of construction would not be adverse under NEPA and would be less than significant under  
30 CEQA. Alternative 1A would result in permanent and temporary impacts on 1,044 acres of modeled  
31 habitat (543 acres of riparian and 501 acres of nonriparian) for valley elderberry longhorn beetle in  
32 the study area in the near-term. These effects would result from the construction of the water  
33 conveyance facilities (CM1, 86 acres of riparian and 265 acres of nonriparian), and implementing  
34 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration  
35 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 521  
36 acres (88%) of impacts on riparian habitat. Based on limited DWR survey data of the Conveyance  
37 Planning Area (see Appendix 12C), an estimated 21 elderberry shrubs would be impacted in the  
38 near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate).

39 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
40 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP  
41 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios  
42 would indicate that 86 acres of the riparian habitat should be restored/created and 86 acres of  
43 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle  
44 habitat. The near-term effects of other conservation actions would require 457 acres of riparian

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

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

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

### 29 ***Late Long-Term Timeframe***

30 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat  
31 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.  
32 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 1,560  
33 acres of modeled valley elderberry longhorn beetle habitat (875 acres of riparian habitat and 685  
34 acres of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study  
35 area). The locations of these losses are described above in the analyses of individual conservation  
36 measures. These losses would not fragment any known populations of valley elderberry longhorn  
37 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat (VRFNC1.2) and  
38 restoring/creating 5,000 acres of riparian habitat in the Plan Area (VFRNC1.1). According to  
39 Objective VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to  
40 occupied habitat, which would provide connectivity between occupied and restored habitats and  
41 improve the species' ability to disperse within and outside the Plan Area. Other factors relevant to  
42 effects on valley elderberry longhorn beetle are listed below.

- 43 ● Habitat loss is widely dispersed throughout the study area and will not be concentrated in any  
44 one location.

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

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

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

31      **CEQA Conclusion:**

32      **Near-Term Timeframe**

33      Because the water conveyance facility construction (CM1) is being evaluated at the project level, the  
34      near-term BDCP conservation strategy has been evaluated to determine whether it would provide  
35      sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
36      impacts of construction would be less than significant. Alternative 1A would result in permanent  
37      and temporary impacts on 1,044 acres of modeled habitat (543 acres of riparian and 501 acres of  
38      nonriparian) for valley elderberry longhorn beetle in the study area in the near-term. These impacts  
39      would result from the construction of the water conveyance facilities (CM1, 86 acres of riparian and  
40      265 acres of nonriparian), and implementing other conservation measures (Yolo Bypass fisheries  
41      improvements [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). Based on limited  
42      DWR survey data of the Conveyance Planning Area, an estimated 21 elderberry shrubs would be  
43      impacted by CM1.

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
2 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn  
3 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian  
4 habitat. Using these typical ratios would indicate that 86 acres of the riparian habitat should be  
5 restored/created and 86 acres of existing riparian should be protected to mitigate the CM1 losses of  
6 valley elderberry longhorn beetle habitat. The near-term effects of other conservation actions would  
7 require 0457 acres of riparian restoration and 457 acres of riparian protection using the same  
8 typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

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

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

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

### 36 ***Late Long-Term Timeframe***

37 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 1,560  
38 acres of modeled valley elderberry longhorn beetle habitat (875 acres of riparian habitat and 685  
39 acres of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study  
40 area). The locations of these losses are described above in the analyses of individual conservation  
41 measures. These losses would not fragment any known populations of valley elderberry longhorn  
42 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat (VFRNC1.2) and  
43 restore or create 5,000 acres of riparian habitat in the Plan Area (VFRNC1.1). According to Objective  
44 VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied

1 habitat, which would provide connectivity between occupied and restored habitats and improve the  
2 species ability to disperse within and outside the Plan Area. The BDCP also includes a number of  
3 AMMs (AMM1–AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts  
4 on valley elderberry longhorn beetle. The large acreages of conservation would adequately  
5 compensate for the modeled habitats lost to construction and restoration activities.

6 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
7 and protection actions discussed above, as well as other actions that overlap with the nonriparian  
8 portions of the species model, could result in the restoration of 4,857 acres (riparian) and the  
9 protection of 2,363 acres (729 acres of riparian and 1,634 acres of nonriparian channels and  
10 grassland) of modeled habitat for valley elderberry longhorn beetle.

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

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

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

32 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing  
33 Alternative 1A conservation actions would not have an adverse effect on valley elderberry longhorn  
34 beetle.

35 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust  
36 and hazardous substances would accompany construction of the water conveyance facilities. An  
37 estimated 37 shrubs could be indirectly affected by conveyance facilities construction (CM1). In  
38 addition, ground-disturbing activities associated with the re-contouring of surface topography,  
39 excavation or modification of channels, type conversion from riparian and grasslands to tidal  
40 habitat, levee removal and modification, and removal of riprap and other protections from channel  
41 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration  
42 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 1A  
43 construction, operation, and maintenance, the BDCP would avoid the potential for substantial  
44 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a



1 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.  
2 Therefore, the indirect effects under this alternative would have a less-than-significant impact on  
3 valley elderberry longhorn beetle.

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

6 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
7 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-1A-14).

8 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled  
9 valley elderberry longhorn beetle habitat (Table 12-1A-14).

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

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

32 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a  
33 result of implementing Alternative 1A conservation actions would not be adverse when taking into  
34 consideration CM7 habitat protection and restoration. This habitat protection and restoration would  
35 be guided by species-specific goals and objectives, and by AMM1-AMM6, AMM10, and AMM15,  
36 which would be in place throughout the time period that periodic effects would occur.

37 **CEQA Conclusion:** Alternative 1A (CM2 and CM5) would have periodic impacts on modeled valley  
38 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)  
39 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may  
40 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the  
41 restoration of 5,000 acres of riparian habitat, and the protection of 750 acres riparian habitat (CM7)  
42 would include areas for elderberry restoration and protection. The BDCP also includes AMM1-  
43 AMM6, AMM10, and AMM15, which would minimize and avoid impacts on valley elderberry

1 longhorn beetle prior to Yolo Bypass fisheries enhancement and floodplain restoration activities.  
2 AMM15, which includes measure for following the USFWS conservation guidelines for valley  
3 elderberry longhorn beetle (U.S. Fish and Wildlife Service 1999a), would be used to identify shrubs  
4 for transplanting to conservation areas that otherwise could be adversely affected by periodic  
5 inundation in Yolo Bypass and floodplain restoration areas. These conservation actions would  
6 compensate for the periodic impacts on valley elderberry longhorn beetle.

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

## 12 **Nonlisted Vernal Pool Invertebrates**

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

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

- 39 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
40 recovery areas (Objective VPNC1.1, associated with CM3).
- 41 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
42 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
43 VPNC1.2, associated with CM9).

- 1 • Increase size and connectivity of protected vernal pool complexes in plan area and increase
- 2 connectivity with complexes outside the Plan Area (Objective VPNC1.3).
- 3 • Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
- 4 VPNC1.4).
- 5 • Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
- 6 supporting and sustaining vernal pool species (Objective VPNC2.1).

7 As explained below, with the restoration or protection of these amounts of habitat, impacts on  
 8 nonlisted vernal pool invertebrates would not be adverse for NEPA purposes and would be less-than  
 9 significant for CEQA purposes.

10 **Table 12-1A-15. Changes in Other Nonlisted Vernal Pool Invertebrate Habitat Associated with**  
 11 **Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	1	1	0	0	NA	NA
	Low-value	2	2	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>201</b>	<b>375</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

12

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

15 Alternative 1A conservation measures would result in the permanent loss of up to 375 acres of  
 16 vernal pool habitat from conveyance facilities construction (CM1) and tidal restoration (CM4). In  
 17 addition, the conservation measures could result in the indirect conversion of an additional 142  
 18 acres of vernal pool habitat (91 acres of high-value habitat and 51 acres of low-value habitat) from  
 19 conveyance facilities construction (CM1) and based on the hypothetical footprints for tidal  
 20 restoration (CM4). Construction of the water conveyance facilities and restoration activities may  
 21 result in the modification of hardpan and changes to the perched water table, which could lead to  
 22 alterations in the rate, extent, and duration of inundation of nearby vernal pool habitat. USFWS

1 typically considers construction within 250 feet of vernal pools to constitute an indirect effect unless  
2 more detailed information is provided to further refine the limits of any such effects. For the  
3 purposes of this analysis, the 250-foot buffer was applied to the water conveyance facilities work  
4 areas where surface and subsurface disturbance activities would take place and to restoration  
5 hypothetical footprints. Habitat enhancement and management activities (CM11), which include  
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

7 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
8 where restoration may occur, actual effects are expected to be lower because sites will be selected  
9 and restoration projects designed to minimize or avoid effects on the vernal pools. As specified in  
10 the BDCP, the BDCP Implementation Office would ensure that tidal restoration projects and other  
11 covered activities would be designed such that no more than a total of 10 wetted acres of vernal  
12 pools are permanently lost. *AMM12 Vernal Pool Crustaceans* would ensure that no more than 20  
13 wetted acres of vernal pools are indirectly affected by BDCP covered activities.

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

- 16 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
17 result in the permanent loss of 3 acres of nonlisted vernal pool invertebrate habitat, composed  
18 of 1 acre of high-value and 2 acres of low-value habitat (Table 12-4-15). In addition, conveyance  
19 facility construction could result in the indirect conversion of 8 acres of modeled habitat in the  
20 vicinity of Clifton Court Forebay. The affected area consists of 2 acres of high-value and 6 acres  
21 low-value habitat. There are no records of these nonlisted vernal pool invertebrates within the  
22 impact footprint (California Department of Fish and Game 2012).
- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
24 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which  
25 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as  
26 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual  
27 signatures that display clear evidence of significant disturbance due to plowing, disking, or  
28 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in  
29 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
30 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery  
31 found that these habitats appear to generally have low densities. However, areas mapped as  
32 degraded vernal pool complex may still provide habitat for vernal pool species as evidenced by  
33 records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella  
34 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Wildlife  
35 2013). So though degraded vernal pool complexes may not represent botanically diverse vernal  
36 pools they still can provide habitat for vernal pool invertebrates and thus the loss of 372 acres of  
37 degraded vernal pool complex may result in the loss of occupied vernal pool invertebrate  
38 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of  
39 vernal pool habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat. No  
40 records of nonlisted vernal pool invertebrates would be directly impacted.
- 41 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
42 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
43 vernal pool complex would benefit vernal pool invertebrates (Table 12-1A-15). A variety of  
44 habitat management actions included in CM11 that are designed to enhance wildlife values in  
45 BDCP-protected habitats may result in localized ground disturbances that could temporarily

1 affect vernal pool invertebrate habitat. Ground-disturbing activities, such as removal of  
 2 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
 3 minor effects on vernal pool invertebrate habitat and are expected to result in overall  
 4 improvements to and maintenance of vernal pool habitat values over the term of the BDCP.  
 5 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
 6 minimized by the AMMs listed below.

7 The following paragraphs summarize the combined effects discussed above and describe other  
 8 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
 9 also included. Table 12-1A-16 was prepared to further analyze Alternative 1A effects on nonlisted  
 10 vernal pool invertebrates using wetted acres of vernal pools in order to compare to the effects of  
 11 this alternative with the effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and*  
 12 *Objectives*, which are measured in wetted acres of vernal pools. Wetted acres were estimated by  
 13 using the BDCP’s assumption that vernal pool complexes support a 15% density of vernal pools.

14 **Table 12-1A-16. Estimated Effects on Wetted Nonlisted Vernal Pool Invertebrate Habitat under**  
 15 **Alternative 1A (acres)**

		Direct		Indirect	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>		5	10	10	20
Alternative 1A Impact <sup>b</sup>	CM1	0.5	0.5	1.2	1.2
	CM4 <sup>c</sup>	30.2	55.8	11.0	20.3
<b>Total</b>		<b>30.7</b>	<b>56.3</b>	<b>12.2</b>	<b>21.52</b>

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

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

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

16  
 17 ***Near-Term Timeframe***

18 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the  
 19 near-term BDCP conservation strategy has been evaluated to determine whether it would provide  
 20 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
 21 effects of construction would not be adverse under NEPA and would be less than significant under  
 22 CEQA. Table 12-1A-15 above lists the impacts on nonlisted vernal pool invertebrate habitat that is  
 23 based on the natural community mapping done within the study area. The impacts from tidal  
 24 natural communities restoration (CM4) are based on hypothetical footprints and do not reflect  
 25 actual impacts on vernal pool habitat considering the BDCP’s commitment to design restoration  
 26 projects to minimize or avoid effects on vernal pools (see AMM12). As seen in Table 12-1A-16, the  
 27 effects of CM1 alone would be well within the near-term limits. As seen in Table 12-1A-16,  
 28 Alternative 1A would not meet the Plan’s near-term biological goals and objectives for direct and

1 indirect effects unless near-term tidal restoration projects are designed to ensure that they do not  
2 exceed these impact limits.

3 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
4 would be 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by  
5 protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.5 wetted acre  
6 of vernal pool (or 3 acres of vernal pool complex using the 15% density) should be restored and 3.4  
7 acres protected (or 23 acres of vernal pool complex) protected to mitigate the CM1 indirect effects  
8 on vernal pool habitat. Assuming that the BDCP would apply the impact limits presented in Table  
9 12-1A-16, impacts on wetted vernal pools resulting from tidal restoration in the near-term could not  
10 exceed 4.5 wetted acres direct and 8.8 wetted acres indirect. The impacts based on the hypothetical  
11 tidal restoration footprints would exceed these limits. When and if these limits are met, the BDCP  
12 would need to restore up to 5 wetted acres (33 acres of vernal pool complex) and protect up to 30  
13 wetted acres (200 acres of vernal pool complex) in the near-term to offset the effects of CM1 and  
14 CM4.

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

- 20 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
21 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly  
22 affected (1:1 ratio).
- 23 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
24 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
25 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

26 The species-specific biological goals and objectives would also inform the near-term protection and  
27 restoration efforts. These Plan goals represent performance standards for considering the  
28 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
29 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool  
30 invertebrate habitat.

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

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

42 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
43 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term (see

1 Objective VPNC1.2 and AMM12). As seen in Table 12-1A-16, the effects of CM1 alone would be well  
2 within the near-term limits but overall Alternative 1A would not meet the Plan's late long-term  
3 biological goals and objectives for direct and indirect effects unless tidal restoration projects are  
4 designed to ensure that that they do not exceed these impact limits.

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

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

15 **NEPA Effects:** The near-term loss of nonlisted vernal pool species habitat under Alternative 1A  
16 would not be adverse because the BDCP has committed to avoiding and minimizing effects resulting  
17 from tidal restoration and to restoring and protecting an acreage that meets or exceeds the typical  
18 mitigation ratios described above. In the absence of other conservation actions, the modification of  
19 vernal pool habitat and potential mortality of special-status species resulting from Alternative 1A in  
20 the late long-term would represent an adverse effect. However, the BDCP has committed to impact  
21 limits for vernal pool habitat and to habitat protection, restoration, management, and enhancement  
22 associated with CM3, CM9, and CM11. This habitat protection, restoration, management and  
23 enhancement would be guided by goals and objectives and by AMM1–AMM6, AMM10, AMM12, and  
24 AMM37, which would be in place throughout the time period of construction. Considering these  
25 commitments, losses and conversion of nonlisted vernal pool species habitat and potential mortality  
26 under Alternative 1A would not be adverse effect.

27 **CEQA Conclusion:**

28 **Near-Term Timeframe**

29 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the  
30 near-term BDCP conservation strategy has been evaluated to determine whether it would provide  
31 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
32 effects of such conveyance facility construction would not be adverse under NEPA and would be less  
33 than significant under CEQA. Table 12-1A-15 above lists the impacts on vernal pool habitat that is  
34 based on the natural community mapping done within the study area. The impacts from tidal  
35 natural communities restoration (CM4) are based on hypothetical footprints and do not reflect  
36 actual impacts on vernal pool habitat considering the BDCP's commitment to design restoration  
37 projects to minimize or avoid effects on vernal pools. As seen in Table 12-1A-16, the effects of CM1  
38 alone would be well within the near-term limits. The BDCP states that covered activities would not  
39 result in more than 5 wetted acres of direct loss and no more than 10 wetted acres of indirect effects  
40 on vernal pools in the near-term. As seen in Table 12-1A-16, Alternative 1A would not meet the  
41 Plan's near-term biological goals and objectives for direct and indirect effects unless near-term tidal  
42 restoration projects are designed to ensure that they do not exceed these impact limits.

1 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
2 would be 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by  
3 protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.5 wetted acre  
4 of vernal pool (or 3 acres of vernal pool complex using the 15% density) should be restored and 3.4  
5 acres (or 23 acres of vernal pool complex) protected to mitigate the CM1 direct and indirect effects  
6 on nonlisted vernal pool invertebrate habitat. Assuming that the BDCP would apply the impact  
7 limits presented in Table 12-1A-16, impacts on wetted vernal pools resulting from tidal restoration  
8 in the near-term could not exceed 4.5 wetted acres direct and 8.8 wetted acres indirect. The impacts  
9 based on the hypothetical tidal restoration footprints would exceed these limits. When and if these  
10 limits are met, the BDCP would need to restore up to 5 wetted acres (33 acres of vernal pool  
11 complex) and protect up to 30 wetted acres (200 acres of vernal pool complex) in the near-term to  
12 offset the effects of CM1 and CM4.

13 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex see Table  
14 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal pools for  
15 each wetted acre directly or indirectly affected. The BDCP has also committed to restoring/creating  
16 vernal pools such that there is no net loss of vernal pool acreage. The amount of restoration will be  
17 determined during implementation based on the following criteria.

- 18 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
19 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly  
20 affected (1:1 ratio).
- 21 ● If restoration takes place concurrent with impacts (i.e., restoration construction is  
22 completed, but restored habitat has not met all success criteria, prior to impacts occurring),  
23 then 1.5 wetted acres of vernal pools will be restored for each wetted acre directly affected  
24 (1.5:1 ratio).

25 The species-specific biological goals and objectives would also inform the near-term protection and  
26 restoration efforts. These Plan goals represent performance standards for considering the  
27 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
28 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool  
29 invertebrates.

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

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



1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
3 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term (see  
4 Objective VPNC1.2 and AMM12). As seen in Table 12-1A-16, the effects of CM1 alone would be well  
5 within the near-term limits but overall Alternative 1A would not meet the Plan's late long-term  
6 biological goals and objectives for direct and indirect effects unless tidal restoration projects are  
7 designed to ensure that that they do not exceed these impact limits.

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

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

18 In the absence of other conservation actions, the effects on nonlisted vernal pool invertebrate  
19 habitat from Alternative 1A would represent an adverse effect as a result of habitat modification of a  
20 special-status species and potential for direct mortality. However, the BDCP has committed to  
21 impact limits for vernal pool habitat and to the habitat protection, restoration, management, and  
22 enhancement associated with CM3, CM9, and CM11. These conservation activities would be guided  
23 by species-specific goals and objectives and by AMM1-AMM6, AMM10, AMM12, and AMM37, which  
24 would be in place throughout the time period of construction. Considering these commitments,  
25 Alternative 1A over the term of the BDCP would not result in a substantial adverse effect through  
26 habitat modifications and would not substantially reduce the number or restrict the range of  
27 nonlisted vernal pool invertebrates. Therefore, Alternative 1A would have a less-than-significant  
28 impact on nonlisted vernal pool invertebrates.

29 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool**  
30 **Invertebrates**

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

36 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
37 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.  
38 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment  
39 could result in the inadvertent release of sediment and hazardous substances into this habitat.  
40 These potential effects would be avoided and minimized through AMM1-AMM6, which would be in  
41 effect throughout the Plan's construction phase. Nonlisted vernal pool invertebrates and their  
42 habitat could be periodically indirectly affected by maintenance activities at water conveyance  
43 facilities. Embankment maintenance activities around Clifton Court Forebays could result in the

1 inadvertent discharge of sediments and hazardous materials into vernal pool habitat that occurs  
2 along the southern and western boundaries of the forebays. These potential effects would be  
3 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the  
4 Plan. The indirect effects of Alternative 1A implementation would not be adverse under NEPA.

5 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
6 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and  
7 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These  
8 potential impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12,  
9 which would be in effect throughout the Plan’s construction phase. Therefore, the indirect effects of  
10 Alternative 1A would have a less-than-significant impact on vernal pool invertebrates.

#### 11 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates’ Habitat** 12 **as a Result of Implementation of Conservation Components**

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

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

27 **CEQA Conclusion:** Alternative 1A would periodically inundate a maximum of 4 acres of nonlisted  
28 vernal pool invertebrates’ habitat during the maximum flows over the Fremont Weir. The periodic  
29 inundation is not anticipated to result in a conversion of nonlisted vernal pool invertebrates’ habitat  
30 into different wetland habitat. BDCP-associated inundation of areas that would not otherwise have  
31 been inundated is expected to occur in no more than 30% of all years, because Fremont Weir is  
32 expected to overtop the remaining 70% of all years, and during those years notch operations will  
33 not typically affect the maximum extent of inundation. In more than half of all years under Existing  
34 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.  
35 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and  
36 would thus result in less-than-significant impacts on the species.

#### 37 **Sacramento and Antioch Dunes Anthicid Beetles**

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

1 The construction, and operations and maintenance of the water conveyance facilities under  
2 Alternative 1A would not likely affect Sacramento and Antioch Dunes anthicid beetles. The  
3 construction of the water conveyance structure and associated infrastructure would generally avoid  
4 affects to channel margins where sand bars are likely to form. Conveyance facilities construction  
5 would not affect inland dune scrub habitat at Antioch Dunes NWR. No dredge spoil areas that could  
6 potentially be occupied by Sacramento anthicid beetle were identified within conveyance facilities  
7 footprints during a review of Google Earth imagery. Also, a review of the locations of the Alternative  
8 1A water intake facilities on aerial imagery did not reveal any sandbars along the channel margins.  
9 These portions of the Sacramento River have steep, riprap lined channel banks that are likely not  
10 conducive to the formation of sandbars.

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

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

- 28 ● Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5).
- 29 ● Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6).
- 30 ● Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored  
31 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

32 These measures will improve shoreline conditions by creating benches along levees, shallow habitat  
33 along margins and in floodplains, and increasing shoreline vegetation, all of which will likely  
34 contribute to the formation of sandbars along Delta river channels where these measures will be  
35 implemented. Increasing the structural diversity of Delta river channel margins and floodplains will  
36 create opportunities for sand to be deposited and for sandbars to subsequently form. As explained  
37 below, potential impacts on Sacramento and Antioch Dunes anthicid beetle would not be adverse for  
38 NEPA purposes and would be less than significant for CEQA purposes.

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

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

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

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

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

- 1       • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration could impact  
2 the areas of sandy soils identified from aerial photographs on Decker Island, the western  
3 portion of Bradford Island, and on the southwestern tip of Grand Island because these areas fall  
4 within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA has been  
5 identified in the BDCP (BDCP Chapter 3, *Conservation Strategy*, Section 3.4.4) as providing  
6 opportunities for creating subtidal aquatic and tidal marsh habitats. The methods and  
7 techniques identified in BDCP Chapter 3, Section 3.4.4.3.3 that may be used for tidal restoration  
8 include the recontouring of lands so that they have elevations suitable for the establishment of  
9 marsh plains and the eventual breaching of levees. There are three CNDDDB records of  
10 Sacramento anthicid beetle (just north of Rio Vista, one just south of Rio Vista along the west  
11 shore of the Sacramento River, and one on Grand Island) and one CNDDDB record of Antioch  
12 Dunes anthicid beetle (just north of Rio Vista) that fall within the West Delta ROA (California  
13 Department of Fish and Wildlife 2013). Tidal restoration actions in the West Delta ROA may  
14 eliminate potential habitat and impact occupied habitat of both Sacramento and Antioch Dunes  
15 anthicid beetles.
- 16       • *CM5 Seasonally Inundated Floodplain Restoration*: Seasonally inundated floodplain restoration  
17 could impact areas with sandbars that were identified in a review of aerial photographs. The  
18 sandbars identified along the San Joaquin River and Paradise Cut are within the conceptual  
19 corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP. There are four  
20 CNDDDB records for Sacramento anthicid beetle in the conceptual corridor along the San Joaquin  
21 River (California Department of Fish and Wildlife 2013). Floodplain restoration actions in these  
22 conceptual corridors could impact potential habitat for both these species and occupied habitat  
23 of Sacramento anthicid beetle.
- 24       • *CM6 Channel Margin Enhancement*: Channel margin enhancement could result in impacts on 20  
25 miles of channel margin that could contain sandbars.

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

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

1 subsequently form. There are three other factors relevant to effects on Sacramento and Antioch  
2 Dunes anthicid beetle.

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

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

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

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

### 39 **Delta Green Ground Beetle**

40 This section describes the effects of Alternative 1A on delta green ground beetle. Suitable habitat in  
41 the study area would be vernal pool complexes and annual grasslands in the general Jepson Prairie  
42 area. The construction, and operations and maintenance of the water conveyance facilities under  
43 Alternative 1A would not affect delta green ground beetle because the facilities and construction

1 area are outside the known range of the species. Implementation of Alternative 1A could affect delta  
2 green ground beetle through the protection of grasslands and vernal pool complex (CM3) in the  
3 vicinity of Jepson Prairie and the subsequent implementation of habitat enhancement and  
4 management actions and recreational trail construction (CM11) in these areas. In addition, tidal  
5 natural communities restoration (CM4) could result in potential impacts on delta green ground  
6 beetle and its habitat. Full implementation of Alternative 1A would likely result in beneficial effects  
7 on delta green ground beetle through the following conservation actions.

- 8 ● Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- 9 ● Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with  
10 CM3).
- 11 ● Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2,  
12 associated with CM9).

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

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

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

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**  
2 **Beetle**

3 Alternative 1A conservation measures could result in the conversion of habitat and/or direct  
4 mortality to delta green ground beetle. Conservation measure that could affect delta green ground  
5 beetle include tidal natural communities habitat restoration (CM4) and habitat enhancement and  
6 management activities (CM11) in CZ 1. CZ 1 is the only portion of the Plan Area that contains  
7 occupied and potential habitat for delta green ground beetle. The range of the delta green ground  
8 beetle is currently believed to be generally bound by Travis Air Force Base to the west, Highway 113  
9 to the east, Hay Road to the north, and Creed Road to the south (Arnold and Kavanaugh 2007; U.S.  
10 Fish and Wildlife Service 2009a). Further discussion of this potential effect is provided below, and  
11 NEPA and CEQA conclusions follow.

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

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



1 would be an adverse effect under Alternative 1A. Mitigation Measure BIO-42, *Avoid Impacts on Delta*  
2 *Green Ground Beetle and its Habitat*, would be available to address this effect.

3 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal  
4 natural communities restoration (CM4), vernal pool restoration (CM9), and recreational trail  
5 construction and subsequent enhancement and management actions (CM11) could impact delta  
6 green ground beetle. Tidal restoration projects around Calhoun Cut and possible Lindsey Slough  
7 could affect habitat and result in direct mortality to the species from excavating channels; modifying  
8 ditches, cuts, and levees to encourage tidal circulation; and scalping higher elevation areas to create  
9 marsh plains. Potential impacts from CM11 could include direct mortality of larvae and adults  
10 resulting from the implementation of recreation trail construction in 15.5 acres of grassland in CZ 1  
11 and from grassland management techniques, which may include livestock grazing, prescribed  
12 burning, and mowing. AMM37 would ensure that new trails in vernal pool complexes are sited at  
13 least 250 feet from wetland features, or closer if site specific information indicates that local  
14 watershed surrounding a vernal pools is not adversely affected. CM11 also includes guidelines and  
15 techniques for invasive plant control, which may include manual control (hand-pulling and digging),  
16 mechanical control (large equipment), and chemical control, though some of these methods would  
17 be restricted in areas where rare plants occur and in critical habitat for vernal pool species. These  
18 actions could result in adverse effects through habitat modification and a possible reduction in the  
19 number of the species or restrict its range, and, therefore, would result in significant impacts on  
20 delta green ground beetle. Implementation of Mitigation Measure BIO-42 would reduce these  
21 impacts to a less-than-significant level.

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

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

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

1            *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S. Fish and  
2            Wildlife Service 2005). Plans will include measures to protect and manage for delta green  
3            ground beetle so that they continue to support existing populations or allow for future  
4            colonization.

#### 5            **Callippe Silverspot Butterfly**

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

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

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

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

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

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

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

1 are thistles, some of which have been identified by the California Invasive Plant Council as having  
2 limited to moderate ecological impacts (California Invasive Plant Council 2006).

3 **NEPA Effects:** The protection of 2,000 acres of grassland within could benefit callippe silverspot  
4 butterfly if these protected areas include occupied and potential habitat on the hill tops in Cordelia  
5 Hills and Potrero Hills. The management of these grasslands according to *CM11 Natural*  
6 *Communities Enhancement and Management* has potential to adversely affect this species. Direct  
7 mortality or the removal of larval host plants and nectar sources for adults would be an adverse  
8 effect under NEPA. Mitigation Measure BIO-43, *Avoid and Minimize Loss of Callippe Silverspot*  
9 *Butterfly Habitat*, would be available to address this effect.

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

### 26 **Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly** 27 **Habitat**

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

- 31 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host  
32 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These  
33 surveys should occur during the plant's blooming period (typically early January through  
34 April)
- 35 • If larval host plants are present, then presence/absence surveys for callippe silverspot  
36 butterfly larvae will be conducted according to the most recent USFWS approved survey  
37 methods by a biologist with previous experience in surveying for and identifying callippe  
38 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult  
39 flight season, which usually starts in mid-May.
- 40 • If larvae are detected then no further surveys are necessary. If larvae are not detected then  
41 surveys for adults will be conducted by a biologist familiar with surveying for and  
42 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8  
43 to 10 weeks.

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

### California Red-Legged Frog

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

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

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

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

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	1	1	0	0	NA	NA
	Upland	5	5	153	153	NA	NA
<b>Total Impacts CM1</b>		<b>6</b>	<b>6</b>	<b>153</b>	<b>153</b>		
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>8</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>14</b>	<b>30</b>	<b>153</b>	<b>153</b>	<b>0</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

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

6 Alternative 1A conservation measures would result in the permanent and temporary loss combined  
7 of up to 1 acre of modeled aquatic habitat and 182 acres of modeled upland habitat for California  
8 red-legged frog (Table 12-1A-20). There are no California red-legged frog occurrences that overlap  
9 with the Plan footprint. Conservation measures that would result in these losses are conveyance  
10 facilities and transmission line construction (CM1) and recreational facility construction for CM11.  
11 Construction activities associated with the water conveyance facilities and recreational facilities,  
12 including operation of construction equipment, could result in temporary effects on, as well as  
13 injury and mortality of, California red-legged frogs. In addition, natural enhancement and  
14 management activities (CM11), which include ground disturbance or removal of nonnative  
15 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
17 facilities could degrade or eliminate California red-legged frog habitat and could result in injury and  
18 mortality of California red-legged frogs. Each of these individual activities is described below. A  
19 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the  
20 individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A, including transmission line  
22 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and 5 acres of  
23 upland habitat for California red-legged frog in CZ 8 (Table 12-1A-20). Permanent effects would  
24 be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension and

1 installation of cross culverts, installation of structural hardscape, and installation and relocation  
2 of utilities. Construction-related effects would temporarily disturb 153 acres of upland habitat  
3 for the California red-legged frog (Table 12-1A-20). Surveys have not found any evidence that  
4 the species is using this habitat (Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan  
5 *EIR/EIS Environmental Data Report*).

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

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

- 22 • *Critical habitat*: Several conservation measures would be implemented in California red-legged  
23 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of  
24 designated critical habitat for the California red-legged frog overlaps with the study area along  
25 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated  
26 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.  
27 Conservation actions to protect and enhance grassland habitat for covered species, including  
28 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated  
29 critical habitat for the California red-legged frog and California tiger salamander. Any habitat  
30 enhancement actions for these species in designated critical habitat are expected to enhance the  
31 value of any affected designated critical habitat for conservation of California red-legged frog.  
32 These actions would result in an overall benefit to California red-legged frog within the study  
33 area through protection and management of grasslands with associated intermittent stream  
34 habitat and through restoration of vernal pool complex habitat and its associated grassland  
35 habitat.

- 36 • *Operations and maintenance*: Ongoing water conveyance facilities operation and maintenance is  
37 expected to have little if any adverse effect on the California red-legged frog. Postconstruction  
38 operation and maintenance of the above-ground water conveyance facilities could result in  
39 ongoing but periodic postconstruction disturbances that could affect California red-legged frog  
40 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use  
41 along transmission corridors in CZ 8, could also result in injury or mortality of California red-  
42 legged frogs if present in work sites. Implementation conservation actions and AMM1–AMM6,  
43 AMM10, AMM14, and AMM37, would reduce these effects.

- 44 • *Injury and direct mortality*: Construction activities associated with the water conveyance  
45 facilities, vernal pool complex restoration, and habitat and management enhancement-related

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

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

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

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

18 Alternative 1A would permanently remove approximately 1 acre of aquatic habitat and 166 acres of  
19 upland terrestrial cover habitat for California red-legged frog. The effects would result from  
20 construction of the water conveyance facilities (CM1, 158 acres) and recreational facilities (CM11, 8  
21 acres).

22 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
23 and that are identified in the biological goals and objectives for California red-legged frog in BDCP  
24 Chapter 3 would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and 2:1 for  
25 protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic habitat  
26 should be restored, 1 acre of aquatic habitat should be protected, and 332 acres of grassland should  
27 be protected for California red-legged frog to mitigate the near-term losses.

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

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



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

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

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

12 The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766  
13 acres of upland habitat for California red-legged frog. Alternative 1A as a whole would result in the  
14 permanent loss of and temporary effects on 1 acre of aquatic habitat and 182 acres of upland habitat  
15 for California red-legged frog for the term of the plan (less than 1% of the total aquatic habitat in the  
16 study area and 1% of the total upland habitat in the study area). The 1 acre of aquatic habitat that  
17 would be permanently lost is not known to be used for breeding. Most of the California red-legged  
18 frog upland habitat that would be removed consists of naturalized grassland or cultivated land in a  
19 highly disturbed or modified setting on lands immediately adjacent to Clifton Court Forebay. The  
20 removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known California red-  
21 legged frog occurrences to the west. However, this habitat consists mostly of cultivated lands and  
22 small patches of grasslands, and past and current surveys in this area have not found any evidence  
23 that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
24 *Environmental Data Report*).

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

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
43 and protection actions discussed above, as well as the restoration of tidal freshwater emergent  
44 wetland, grassland, valley/foothill riparian, and vernal pool complex that could overlap with the

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

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

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

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

21 Alternative 1A would permanently remove approximately 1 acre of aquatic habitat and 166 acres of  
22 upland terrestrial cover habitat for California red-legged frog. The effects would result from  
23 construction of the water conveyance facilities (CM1, 158 acres) and recreational facilities (CM11, 8  
24 acres).

25 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
26 and that are identified in the biological goals and objectives for California’s red-legged frog in  
27 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and  
28 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic  
29 habitat should be restored, 1 acre of aquatic habitat should be protected, and 332 acres of grassland  
30 should be protected for California red-legged frog to mitigate the near-term losses.

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

41 These conservation actions would occur in the same timeframe as the construction losses, thereby  
42 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
43 represent performance standards for considering the effectiveness of CM3 protection and

1 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
2 and the additional detail in the biological objectives for California red-legged frog satisfy the typical  
3 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
4 term effects of the other conservation measures.

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

9 These commitments are more than sufficient to support the conclusion that the near-term effects of  
10 Alternative 1A on California red-legged frog would be less than significant under CEQA, because the  
11 number of acres required to meet the typical ratios described above would be only 1 acre of aquatic  
12 habitat restored, 1 acre of aquatic habitat protected, and 332 acres of upland communities  
13 protected.

#### 14 ***Late Long-Term Timeframe***

15 The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766  
16 acres of upland habitat for California red-legged frog. Alternative 1A as a whole would result in the  
17 permanent loss of and temporary effects on 1 acre of aquatic habitat and 182 acres of upland habitat  
18 for California red-legged frog for the term of the plan (less than 1% of the total aquatic habitat in the  
19 study area and 1% of the total upland habitat in the study area). The 1 acre of aquatic habitat that  
20 would be permanently lost is not known to be used for breeding. Most of the California red-legged  
21 frog upland habitat that would be removed consists of naturalized grassland or cultivated land in a  
22 highly disturbed or modified setting on lands immediately adjacent to Clifton Court Forebay. The  
23 removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known California red-  
24 legged frog occurrences to the west. However, this habitat consists mostly of cultivated lands and  
25 small patches of grasslands, and past and current surveys in this area have not found any evidence  
26 that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
27 *Environmental Data Report*).

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

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
2 and protection actions discussed above, as well as the restoration of tidal freshwater emergent  
3 wetland, grassland, valley/foothill riparian, and vernal pool complex that could overlap with the  
4 species model, would result in the restoration of 16 acres of aquatic and 351 acres of upland  
5 modeled habitat for California red-legged frog. In addition, protection of managed wetland,  
6 grassland, valley/foothill riparian, and vernal pool complex could overlap with the species model  
7 and would result in the protection of 3 acres of aquatic and 1,047 acres of upland California red-  
8 legged frog modeled habitat.

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

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

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

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

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

35 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well  
36 as construction-related noise and visual disturbances, could impact California red-legged frog in  
37 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
38 accidental release of petroleum or other contaminants that could impact California red-legged frog  
39 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California red-  
40 legged frog habitat could also have a negative impact on the species or its prey. With  
41 implementation of AMM1-AMM6, AMM10, AMM14, and AMM37, construction, operation, and  
42 maintenance under Alternative 1A would avoid the potential for substantial adverse effects on  
43 California red-legged frog, either indirectly or through habitat modifications, and would not result in

1 a substantial reduction in numbers or a restriction in the range of California red-legged frogs. The  
2 indirect effects of Alternative 1A would have a less-than-significant impact on California red-legged  
3 frogs.

#### 4 **California Tiger Salamander**

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

13 Alternative 1A is expected to result in the temporary and permanent removal of upland habitat that  
14 California tiger salamander uses for cover and dispersal (Table 12-1A-21). Potential aquatic habitat  
15 for this species would not be affected. While stock ponds are underrepresented as a modeled  
16 habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative 1A  
17 would also include the following biological objectives over the term of the BDCP to benefit the  
18 California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 19 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
20 between existing conservation lands (Objective L1.6, associated with CM3).
- 21 ● Increase native species diversity and relative cover of native plant species, and reduce the  
22 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 23 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
24 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
25 associated with CM3, CM8, and CM11).
- 26 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
27 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 28 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
29 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 30 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
31 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
32 ASWNC2.3, associated with CM11).
- 33 ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core  
34 vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of  
35 California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
36 associated with CM3).
- 37 ● Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool  
38 acreage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated  
39 impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of  
40 vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

- 1 • Increase the size and connectivity of protected vernal pool complex within the Plan Area and  
2 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective  
3 VPNC1.3, associated with CM3).
- 4 • Protect the range of inundation characteristics that are currently represented by vernal pools  
5 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 6 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 7 • Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
8 GNC1.2, associated with CM3 and CM8).
- 9 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
10 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
11 CM3).
- 12 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
13 CM11).
- 14 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
15 duration and suitable composition of vegetative cover to support breeding for covered  
16 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

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

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

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	5	5	158	158	NA	NA
<b>Total Impacts CM1</b>		<b>5</b>	<b>5</b>	<b>158</b>	<b>158</b>		
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191-639	0
<b>Total Impacts CM2-CM18</b>		<b>292</b>	<b>634</b>	<b>0</b>	<b>0</b>	<b>191-639</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>297</b>	<b>639</b>	<b>158</b>	<b>158</b>	<b>191-639</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**  
2 **Salamander**

3 Alternative 1A conservation measures would result in the permanent and temporary loss combined  
4 of up to 797 acres of modeled upland habitat for California tiger salamander (Table 12-1A-21).  
5 There are no California tiger salamander occurrences that overlap with the Plan footprint.  
6 Conservation measures that would result in these losses are conveyance facilities and transmission  
7 line construction, and establishment and use of RTM, borrow, and spoil areas (CM1), Fremont  
8 Weir/Yolo Bypass improvements (CM2), tidal natural communities restoration (CM4), construction  
9 of recreational facilities (CM11), and construction of a conservation fish hatchery (CM18). Habitat  
10 enhancement and management activities (CM11), which include ground disturbance or removal of  
11 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
12 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
13 facilities could degrade or eliminate California tiger salamander habitat. Each of these individual  
14 activities is described below. A summary statement of the combined impacts and NEPA effects and a  
15 CEQA conclusion follow the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities,  
17 including transmission lines, would result in the permanent loss of 5 acres of upland habitat for  
18 California tiger salamander habitat, primarily in CZ 8 (Table 12-1A-21). Permanent effects  
19 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension  
20 and installation of cross culverts, installation of structural hardscape, and installation and  
21 relocation of utilities. Construction-related effects would temporarily disturb 158 acres of  
22 upland habitat for the California tiger salamander (Table 12-1A-21). The area that would be  
23 affected by conveyance facilities construction is south of Clifton Court Forebay, where modeled  
24 California tiger salamander habitat is of relatively low value in that it consists of fragmented  
25 patches of primarily terrestrial habitat surrounded by actively cultivated lands. The highest  
26 concentration of California tiger salamander occurrences are in CZ 8 and are west of the  
27 conveyance facilities alignment, while lands to the east consist primarily of actively cultivated  
28 lands that are not suitable for the species. Habitat loss in this area is not expected to contribute  
29 to habitat fragmentation or impede important California tiger salamander dispersal.
- 30 • *CM2 Yolo Bypass Fisheries Enhancement:* Improvements in the Yolo Bypass would result in the  
31 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the  
32 California tiger salamander in the late-longterm. The modeled habitat in the Yolo Bypass is of  
33 low potential for California tiger salamander: There have been no observations of California  
34 tiger salamander in this area based on the results of a number of surveys for vernal pool  
35 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or  
36 large grassland areas with stock ponds and similar aquatic features that hold water long enough  
37 to provide potential breeding habitat for this species.
- 38 • *CM4 Tidal Natural Communities Restoration:* This activity would result in the permanent  
39 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area  
40 in the late longterm. Tidal restoration in the Cache Slough area would result in habitat loss along  
41 the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the eastern  
42 edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the  
43 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool  
44 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson  
45 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and  
46 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species, however, the

1 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded  
2 occurrences in this area. The tidal restoration at Lindsey Slough along the northeastern edge of  
3 the Jepson Prairie block of habitat and would not contribute to fragmentation. Because the  
4 estimates of habitat loss resulting from tidal inundation are based on projections of where  
5 restoration may occur, actual effects are expected to be lower because of the ability to select  
6 sites that minimize effects on California tiger salamander.

- 7 ● *CM11 Natural Communities Enhancement and Management*: An estimated 40 acres of terrestrial  
8 cover and aestivation habitat for the California tiger salamander would be removed as a result of  
9 constructing trails and associated recreational facilities. Passive recreation in the reserve  
10 system could result in trampling and disturbance of eggs and larvae in water bodies,  
11 degradation of water quality through erosion and sedimentation, and trampling of sites adjacent  
12 to upland habitat used for cover and movement. However, *AMM37 Recreation* requires  
13 protection of water bodies from recreational activities and requires trail setbacks from  
14 wetlands. With these restrictions, recreation-related effects on California tiger salamander are  
15 expected to be minimal.

16 Habitat enhancement- and management-related activities in protected California tiger  
17 salamander habitats would result in overall improvements to and maintenance of California  
18 tiger salamander habitat values over the term of the BDCP. At least 1,000 acres of grassland  
19 habitat and some unknown acres of vernal pool complex habitat in CZ 8 are expected to benefit  
20 the California tiger salamander through protection of existing upland cover and dispersal  
21 habitat from potential loss or degradation that otherwise could happen with future changes in  
22 existing land use.

23 Activities associated with natural communities enhancement and management over the term of  
24 the BDCP in protected California tiger salamander habitat, such as ground disturbance or  
25 herbicide use to control nonnative vegetation, could result in local adverse habitat effects and  
26 injury or mortality of California tiger salamander and disturbance effects if individuals are  
27 present in work sites. Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 would  
28 reduce these effects. Herbicides would only be used in California tiger salamander habitat in  
29 accordance with the written recommendation of a licensed, registered Pest Control Advisor and  
30 in conformance with label precautions and federal, state, and local regulations in a manner that  
31 avoids or minimizes harm to the California tiger salamander.

- 32 ● *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of  
33 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger  
34 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have  
35 not been developed, although the facility is expected to be constructed near Rio Vista on  
36 cultivated lands in low-value habitat for the species.
- 37 ● *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie  
38 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located  
39 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat  
40 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with  
41 some restoration taking place along the Barker and Lindsey Slough channels west to  
42 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough  
43 Channel west of SR 113 into Critical Habitat Unit 2.
- 44 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
45 little if any adverse effect on the California tiger salamander. Postconstruction operation and



1 maintenance of the above-ground water conveyance facilities could result in ongoing but  
2 periodic disturbances that could affect California tiger salamander use of the surrounding  
3 habitat. Operation of maintenance equipment, including vehicle use along transmission  
4 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if  
5 present in work sites. These effects, however, would be minimized with implementation of the  
6 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and  
7 AMM37.

- 8 • Injury and direct mortality: Construction activities associated with the water conveyance  
9 facilities, vernal pool complex restoration, and habitat and management enhancement-related  
10 activities, including operation of construction equipment, could result in injury or mortality of  
11 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered  
12 during construction activities, resulting in injury or mortality of California tiger salamander if  
13 the species is present. Salamanders occupying burrows could be trapped and crushed during  
14 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to  
15 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would  
16 be avoided and minimized through implementation of seasonal constraints and preconstruction  
17 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside  
18 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

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

### 22 ***Near-Term Timeframe***

23 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
24 term BDCP conservation strategy has been evaluated to determine whether it would provide  
25 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
26 construction effects would not be adverse under NEPA.

27 Alternative 1A would permanently remove approximately 455 acres of upland terrestrial cover  
28 habitat for California tiger salamander. The effects would result from construction of the water  
29 conveyance facilities (CM1, 163 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat  
30 restoration (CM4, 203 acres), recreational facilities (CM11, 12 acres) and construction of  
31 conservation hatcheries (CM18, 35 acres).

32 Typical NEPA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate  
33 that 910 acres of grassland should be protected in the near-term for California tiger salamander to  
34 mitigate the near-term losses.

35 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
36 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic  
37 habitat (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective  
38 GNC1.1). The landscape-scale goals and objectives would inform the near-term protection and  
39 restoration efforts. The natural community restoration and protection activities are expected to be  
40 concluded during the first 10 years of plan implementation, which is close enough in time to the  
41 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are  
42 more than sufficient to support the conclusion that the near-term effects of Alternative 1A would be

1 not be adverse under NEPA, because the number of acres required to meet the typical ratios  
2 described above would be only 910 acres of upland communities protected.

3 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM13 California Tiger*  
8 *Salamander*, and *AMM37 Recreation*. These AMMs include elements that avoid or minimize the risk  
9 of affecting habitats and species adjacent to work areas and storage sites. The AMMs are described  
10 in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

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

12 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
13 29,459 acres of upland habitat for California tiger salamander. Alternative 1A as a whole would  
14 result in the permanent loss of and temporary effects on 797 acres of upland habitat for California  
15 tiger salamander for the term of the plan (less than 3% of the total upland habitat in the study area).  
16 The location of these losses is described above in the discussions of CM1, CM2, CM4, CM11, and  
17 CM18.

18 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
19 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
20 benefit the California tiger salamander by providing habitat in the portion of the study area with the  
21 highest long-term conservation value for the species based on known species occurrences and large,  
22 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
23 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
24 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
25 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
26 depth and duration and suitable composition of vegetative cover to support breeding California tiger  
27 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and  
28 other measures would be implemented as described in CM11 to promote growth of aquatic  
29 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands  
30 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*  
31 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.  
32 This objective would ensure that California tiger salamander upland and associated aquatic habitats  
33 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat  
34 within and adjacent to the Plan Area.

35 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
36 and protection actions discussed above, as well as the restoration of alkali seasonal wetland  
37 complex, vernal pool complex, and grassland that could overlap with the species model, would result  
38 in the restoration of 88 acres of aquatic and 598 acres of upland modeled habitat for California tiger  
39 salamander. In addition, protection of alkali seasonal wetland complex, vernal pool complex, and  
40 grassland that could overlap with the species model, would result in the protection of 750 acres of  
41 aquatic and 5,000 acres of upland California tiger salamander modeled habitat.

42 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 1A  
43 would be not be adverse because the BDCP has committed to protecting the acreage required to  
44 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger

1 salamander upland habitat associated with Alternative 1A, in the absence of other conservation  
2 actions, would represent an adverse effect as a result of habitat modification and potential direct  
3 mortality of a special-status species. However, with habitat protection and restoration associated  
4 with the conservation components, guided by landscape-scale goals and objectives and by AMM1–  
5 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 1A as a whole on California tiger  
6 salamander would not be adverse.

7 ***CEQA Conclusion:***

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
10 term BDCP conservation strategy has been evaluated to determine whether it would provide  
11 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
12 construction impacts would be less than significant.

13 Alternative 1A would permanently remove approximately 455 acres of upland terrestrial cover  
14 habitat for California tiger salamander. The effects would result from construction of the water  
15 conveyance facilities (CM1, 163 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat  
16 restoration (CM4, 203 acres), recreational facilities (CM11, 12 acres) and construction of  
17 conservation hatcheries (CM18, 35 acres).

18 Typical CEQA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate  
19 that 910 acres of grassland should be protected in the near-term for California tiger salamander to  
20 mitigate the near-term losses.

21 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
22 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic  
23 habitat (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective  
24 GNC1.1). The landscape-scale goals and objectives would inform the near-term protection and  
25 restoration efforts. The natural community restoration and protection activities are expected to be  
26 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
27 occurrence of impacts to constitute adequate mitigation for CEQA purposes.

28 In addition, the plan contains commitments to implement AMM1–6, AMM10, AMM13, and AMM37  
29 which include elements that avoid or minimize the risk of affecting habitats and species adjacent to  
30 work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance*  
31 *and Minimization Measures*. These commitments are more than sufficient to support the conclusion  
32 that the near-term impacts of Alternative 1A on California tiger salamander would be less than  
33 significant under CEQA, because the number of acres required to meet the typical ratios described  
34 above would be only 910 acres of upland communities protected.

35 ***Late Long-Term Timeframe***

36 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
37 29,459 acres of upland habitat for California tiger salamander. Alternative 1A as a whole would  
38 result in the permanent loss of and temporary effects on 797 acres of upland habitat for California  
39 tiger salamander for the term of the plan (less than 3% of the total upland habitat in the study area).  
40 The location of these losses is described above in the discussions of CM1, CM2, CM4, CM11, and  
41 CM18.

1 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
2 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
3 benefit the California tiger salamander by providing habitat in the portion of the study area with the  
4 highest long-term conservation value for the species based on known species occurrences and large,  
5 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
6 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
7 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
8 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
9 depth and duration and suitable composition of vegetative cover to support breeding California tiger  
10 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and  
11 other measures would be implemented as described in CM11 to promote growth of aquatic  
12 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands  
13 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*  
14 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.  
15 This objective would ensure that California tiger salamander upland and associated aquatic habitats  
16 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat  
17 within and adjacent to the Plan Area.

18 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
19 and protection actions discussed above, as well as the restoration of alkali seasonal wetland  
20 complex, vernal pool complex, and grassland that could overlap with the species model, would result  
21 in the restoration of 88 acres of aquatic and 598 acres of upland modeled habitat for California tiger  
22 salamander. In addition, protection of alkali seasonal wetland complex, vernal pool complex, and  
23 grassland that could overlap with the species model, would result in the protection of 750 acres of  
24 aquatic and 5,000 acres of upland California tiger salamander modeled habitat.

25 In the absence of other conservation actions, the losses of California tiger salamander upland habitat  
26 associated with Alternative 1A would represent an adverse effect as a result of habitat modification  
27 and potential direct mortality of a special-status species. However, with habitat protection and  
28 restoration associated with the conservation components, guided by landscape-scale goals and  
29 objectives and by AMM1-AMM6, AMM10, AMM13, and AMM37, which would be in place throughout  
30 the construction phase, the impacts of Alternative 1A as a whole on California tiger salamander  
31 would not be significant under CEQA.

#### 32 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

33 Indirect effects could occur outside of the construction footprint but within 500 feet of California  
34 tiger salamander habitat. Activities associated with conservation component construction and  
35 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
36 conveyance facilities, including the transmission facilities, could result in ongoing but periodic  
37 postconstruction disturbances with localized effects on California tiger salamander and its habitat,  
38 and temporary noise and visual disturbances over the term of the BDCP. Most of the areas indirectly  
39 affected are associated with the construction of Byron Forebay and its borrow and spoil areas in  
40 CZ 8.

41 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
42 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
43 of California tiger salamander habitat downstream of the construction area by filling in pools and  
44 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the

1 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants  
2 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
3 quality and California tiger salamander.

4 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 1A  
5 would avoid or minimize the potential for substantial adverse effects on California tiger  
6 salamanders, either indirectly or through habitat modifications. These AMMs would also avoid and  
7 minimize effects that could substantially reduce the number of California tiger salamanders or  
8 restrict the species’ range. Therefore, the indirect effects of Alternative 1A would not have an  
9 adverse effect on California tiger salamander.

10 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
11 as construction-related noise and visual disturbances could impact California tiger salamander in  
12 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
13 accidental release of petroleum or other contaminants that could impact California tiger salamander  
14 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California tiger  
15 salamander habitat could also have a negative impact on the species or its prey. With  
16 implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 as part of Alternative 1A, the BDCP  
17 would avoid the potential for substantial adverse effects on California tiger salamander, either  
18 indirectly or through habitat modifications, and would not result in a substantial reduction in  
19 numbers or a restriction in the range of California tiger salamanders. The indirect effects of  
20 Alternative 1A would have a less-than-significant impact on California tiger salamander.

#### 21 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a** 22 **Result of Implementation of Conservation Components**

23 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in  
24 periodic inundation of California tiger salamander habitat. Periodic inundation could affect from an  
25 estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an estimated 639 acres  
26 of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-1A-21). This effect would  
27 only occur during an estimated maximum of 30% of years, in areas that are already inundated in  
28 more than half of all years; therefore, these areas are expected to provide only marginal terrestrial  
29 habitat for the California tiger salamander under existing conditions. No aquatic breeding habitat  
30 would be affected (Table 12-1A-21): the modeled habitat in the Yolo Bypass, in the vicinity of  
31 terrestrial habitat is of low value in that there are no California tiger salamander records in this area  
32 and the bypass lacks vernal pool complexes with large, deep pools, or large grassland areas with  
33 stock ponds and similar aquatic features that provide the habitat of highest value for this species.  
34 Therefore, the terrestrial habitat to be affected has a small likelihood of supporting California tiger  
35 salamanders, and Yolo Bypass operations are expected to have a minimal effect on the species, if  
36 any.

37 **NEPA Effects:** The effects of periodic inundation from Alternative 1A would not have an adverse  
38 effect on California tiger salamander.

39 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically  
40 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for  
41 California tiger salamander. Because this area is considered low-value habitat and there are no  
42 California tiger salamander records in the area, and because of the lack of suitable breeding habitat  
43 in this area, the effects of periodic inundation of California tiger salamander habitat from Alternative  
44 1A would have a less-than-significant impact.

## 1 Giant Garter Snake

2 This section describes the effects of Alternative 1A, including water conveyance facilities  
3 construction and implementation of other conservation components, on the giant garter snake. The  
4 habitat model used to assess effects for the giant garter snake is based on aquatic habitat and upland  
5 habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun Marsh),  
6 tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and nontidal  
7 perennial aquatic natural communities; rice fields; and artificial canals and ditches. Modeled upland  
8 habitat is composed of all nonwetland and nonaquatic natural communities within 200 feet of  
9 modeled aquatic habitat features (primarily grassland and cropland). The modeled upland habitat is  
10 ranked as high-, moderate-, or low-value based on giant garter snake associations between  
11 vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical and recent  
12 occurrence records (*Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
13 *Data Report*), and presence of features necessary to fulfill the species' life cycle requirements.  
14 Modeled habitat is expressed in acres for aquatic and upland habitats, and in miles for linear  
15 movement corridors in aquatic habitat. Other factors considered in assessing the value of affected  
16 habitat for the giant garter snake, to the extent that information is available, are proximity to  
17 conserved lands and recorded occurrences of the species, proximity to giant garter snake  
18 subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that  
19 are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and  
20 contribution to connectivity between giant garter snake subpopulations.

21 Construction and restoration associated with Alternative 1A conservation measures would result in  
22 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table  
23 12-1A-22. Full implementation of Alternative 1A would also include the following biological  
24 objectives over the term of the BDCP to benefit the giant garter snake (BDCP Chapter 3, *Conservation*  
25 *Strategy*).

- 26 • Increase native species diversity and relative cover of native plant species, and reduce the  
27 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 28 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
29 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
30 TFEWNC1.1, associated with CM3 and CM4).
- 31 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
32 and nontidal freshwater emergent wetland natural communities, with suitable habitat  
33 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
34 associated with CM3 and CM10).
- 35 • Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other  
36 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 37 • Target cultivated land conservation to provide connectivity between other conservation lands  
38 (Objective CLNC1.2, associated with CM3).
- 39 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
40 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
41 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
42 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
43 with CM3 and CM11).

- 1       ● Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create  
2       600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500  
3       acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective  
4       GGS1.1, associated with CM3, CM4, and CM10).
- 5       ● Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored  
6       under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake  
7       habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or  
8       created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 9       ● Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands  
10      (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot  
11      buffers between protected giant garter snake habitat and roads (other than those roads  
12      primarily used to support adjacent cultivated lands and levees). Establish giant garter snake  
13      reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective  
14      GGS1.3, associated with CM3).
- 15      ● Create connections from the White Slough population to other areas in the giant garter snake's  
16      historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least  
17      1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter  
18      snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater  
19      emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater  
20      emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to  
21      500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored  
22      aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
- 23      ● Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create  
24      600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2  
25      (Objective GGS2.1, associated with CM3 and CM10).
- 26      ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored  
27      under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the  
28      600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,  
29      associated with CM3 and CM8).
- 30      ● To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,  
31      protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder  
32      consisting of compatible cultivated land that can support giant garter snakes. The cultivated  
33      lands may be a subset of lands protected for the cultivated lands natural community and other  
34      covered species (Objective GGS2.3, associated with CM3).
- 35      ● Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or  
36      protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by  
37      establishing 200-foot buffers between protected giant garter snake habitat and roads, and  
38      establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for  
39      urban development (Objective GGS2.4, associated with CM3).
- 40      ● Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,  
41      perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may  
42      consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of  
43      tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets  
44      giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields

1 in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*  
 2 *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value  
 3 habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable  
 4 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with  
 5 CM3, CM4, and CM10).

6 As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
 7 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes  
 8 and would be less than significant for CEQA purposes.

9 **Table 12-1A-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 1A<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Aquatic (acres)	52	52	36	36	NA	NA
	Upland (acres)	392	392	182	182	NA	NA
	Aquatic (miles)	18	18	8	8	NA	NA
<b>Total Impacts CM1 (acres)</b>		<b>444</b>	<b>444</b>	<b>218</b>	<b>218</b>		
CM2–CM18	Aquatic (acres)	179	498	15	38	NA	69
	Upland (acres)	1,467	2,443	219	261	582–1,402	606
	Aquatic (miles)	49	189	9	10	0	NA
<b>Total Impacts CM2–CM18 (acres)</b>		<b>1,646</b>	<b>2,941</b>	<b>234</b>	<b>299</b>	<b>582–1,402</b>	<b>675</b>
<b>TOTAL IMPACTS CM1–CM18 (acres)</b>		<b>2,090</b>	<b>3,385</b>	<b>452</b>	<b>517</b>	<b>582–1,402</b>	<b>675</b>

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

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

<sup>c</sup> Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

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

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

NT = near-term

LLT = late long-term

NA = not applicable

10

11 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

12 Alternative 1A conservation measures would result in the permanent and temporary loss combined  
 13 of up to 624 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,278 acres of  
 14 modeled upland habitat, and up to 225 miles of channels providing aquatic movement habitat for  
 15 the giant garter snake (Table 12-1A-22). There is one giant garter snake occurrence that overlaps  
 16 with the Plan footprint. Conservation measures that would result in these losses are conveyance  
 17 facilities and transmission line construction, and establishment and use of RTM (CM1), Fremont  
 18 Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration



1 (CM5), and construction of a conservation fish hatchery (CM18). Habitat enhancement and  
2 management activities (CM11), which include ground disturbance or removal of nonnative  
3 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
4 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
5 facilities could degrade or eliminate giant garter snake habitat. Each of these individual activities is  
6 described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
7 conclusion follow the individual conservation measure discussions.

8 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities would  
9 result in the permanent loss of approximately 444 acres of modeled giant garter snake habitat,  
10 composed of 52 acres of aquatic habitat and 392 acres of upland habitat (Table 12-1A-22). The  
11 392 acres of upland habitat that would be removed for the construction of the conveyance  
12 facilities consists of 73 acres of high-, 292 acres of moderate-, and 27 acres of low-value habitat.  
13 In addition, approximately 18 miles of channels providing giant garter snake movement habitat  
14 would be removed as a result of conveyance facilities construction. Development of the water  
15 conveyance facilities would also result in the temporary removal of up to 36 acres of giant garter  
16 snake aquatic habitat and up to 162 acres of adjacent upland habitat in areas near construction  
17 in CZ 5 and CZ 6 (see Table 12-1A-22 and Terrestrial Biology Map Book). In addition,  
18 approximately 8 miles of channels providing giant garter snake movement habitat would be  
19 temporarily removed as a result of conveyance facilities construction. Most of the habitat to be  
20 lost is in CZ 6 on Mandeville Island. Refer to the Terrestrial Biology Map Book for a detailed view  
21 of Alternative 1A construction locations. Water facilities construction and operation is expected  
22 to have low to moderate potential for adverse effects on giant garter snake aquatic habitat on  
23 Mandeville Island because it is not located near or between populations identified in the draft  
24 recovery plan.

25 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries  
26 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
27 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter  
28 snake in the late long-term. Approximately 14 miles (less than 1% of total miles in Plan Area) of  
29 channels providing giant garter snake habitat for movements would be removed as a result of  
30 Fremont Weir/Yolo Bypass Improvements. Most of this habitat removal would occur at the  
31 north end of the Yolo Bypass, near Fremont Weir. Construction is expected to have adverse  
32 effects on giant garter snake aquatic habitat in the Yolo Bypass area because it is near the Yolo  
33 Basin/Willow Slough population. The upland habitat that would be removed is composed of 336  
34 acres of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat.

35 In addition to habitat loss from construction related activities in Yolo Bypass, late season  
36 flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant  
37 garter snake) by precluding the preparation and planting of rice fields. The methods for  
38 estimating loss of rice in the bypass and results are provided in BDCP Appendix 5J, Attachment  
39 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo*  
40 *Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was  
41 considered to occur late long-term.

42 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result  
43 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland  
44 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat  
45 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and  
46 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant

1 garter snake movement habitat would be removed as a result of tidal natural communities  
2 restoration.

3 Most of the effects of tidal natural communities restoration would occur in the Cache Slough and  
4 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and  
5 near Category 1 open space but is not near any giant garter snake occurrences and is not near or  
6 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural  
7 communities restoration is expected to have little to no adverse effects on giant garter snake  
8 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences  
9 in this area, which is already tidally influenced so it has limited value for the giant garter snake  
10 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with  
11 a strong tidal influence).

- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
13 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
14 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.  
15 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of  
16 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake  
17 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated  
18 floodplain restoration is expected to have little to no adverse effects on giant garter snake  
19 aquatic habitat because the site is not located near or between giant garter snake populations  
20 identified in the draft recovery plan. As with CM4, the estimates of the effect of seasonal  
21 floodplain levee construction and inundation are based on projections of where restoration may  
22 occur. Actual effects are expected to be lower because sites would be selected to minimize  
23 effects on giant garter snake habitat.

- 24 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
25 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected  
26 habitats may result in localized ground disturbances that could temporarily remove small  
27 amounts of giant garter snake habitat. Ground-disturbing activities, such as removal of  
28 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
29 minor effects on available giant garter snake habitat and are expected to result in overall  
30 improvements to and maintenance of giant garter snake habitat values over the term of the  
31 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
32 and minimized by the applicable AMMs.

33 Passive recreation in the reserve system could result in human disturbance of giant garter  
34 snakes basking in upland areas and compaction of upland burrow sites used for brumation.  
35 However, *AMM37 Recreation*, described in BDCP Appendix 3.C, *Avoidance and Minimization*  
36 *Measures*, requires setbacks for trails in giant garter snake habitat. With this measure in place,  
37 recreation related effects on giant garter snake are expected to be minimal.

- 38 ● *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the  
39 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in  
40 the Yolo Bypass area (CZ 2).
- 41 ● *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground  
42 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
43 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo  
44 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,  
45 and CZ 8). Maintenance activities would include vegetation management, levee and structure

1 repair, and regrading of roads and permanent work areas. These effects, however, would be  
2 reduced by AMMs and conservation actions as described below. Injury and direct mortality:  
3 Construction vehicle activity may cause injury or mortality of the giant garter snake. If snakes  
4 reside where activities take place (most likely in the vicinity of the two subpopulations: Yolo  
5 Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ 4]), the operation of  
6 equipment for land clearing, construction, conveyance facilities operation and maintenance, and  
7 habitat restoration, enhancement, and management could result in injury or mortality of giant  
8 garter snakes. This risk is highest from late fall through early spring, when the snakes are  
9 dormant. Increased vehicular traffic associated with BDCP actions could contribute to a higher  
10 incidence of road kill. However, preconstruction surveys would be implemented after the  
11 project planning phase and prior to any ground-disturbing activity. Any disturbance to suitable  
12 aquatic and upland sites in or near the project footprint would be avoided to the extent feasible,  
13 and the loss of aquatic habitat and grassland vegetation would be minimized through  
14 adjustments to project design, as practicable. Construction monitoring and other measures  
15 would be implemented to avoid and minimize injury or mortality of this species during  
16 construction, as described in *AMM16 Giant Garter Snake*.

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

#### 20 ***Near-Term Timeframe***

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

25 Alternative 1A would permanently and temporarily remove 282 acres of aquatic habitat and 2,260  
26 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
27 would result from the construction of the water conveyance facilities (CM1, 88 acres of aquatic and  
28 574 acres of upland habitat), from Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic  
29 and 458 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres  
30 of upland habitat), and from Conservation Hatcheries (CM18, 35 acres of upland habitat). The  
31 aquatic habitat losses would occur in tidal and nontidal wetland natural communities and rice fields.  
32 The upland habitat losses would occur in cropland and grassland communities. In addition,  
33 approximately 84 miles of channels (irrigation and drainage canals) providing giant garter snake  
34 movement habitat would be removed. The habitat model likely overestimates the relative value of  
35 irrigation and drainage canals in the vicinity of White Slough and south due to its proximity to  
36 records that likely represent single displaced snakes, not viable populations.

37 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
38 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
39 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
40 of upland habitats. Using these ratios would indicate that 282 acres of aquatic habitat should be  
41 restored, 282 acres of aquatic habitat should be protected, and 4,520 acres of upland habitat should  
42 be protected for giant garter snake to mitigate the near-term losses.

43 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to  
44 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to

1 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres  
2 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least  
3 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
4 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900  
5 acres under Objective GGS3.1) would be restored or protected to create connections from the  
6 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.  
7 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected  
8 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
9 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
10 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage  
11 ditches located in cultivated lands and suitable for giant garter snake movement would be  
12 maintained and protected within the reserve system, which would include isolated valley oak trees,  
13 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
14 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

15 These habitat protection and restoration measures would benefit the giant garter snake and the  
16 plan's species-specific biological goals and objectives would inform the near-term protection and  
17 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
18 providing connectivity between protected areas, is considered the most effective approach to giant  
19 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
20 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
21 are identified as important for the recovery of the species in the draft recovery plan for the species  
22 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
23 would focus on these two important subpopulations.

24 The species-specific biological goals and objectives would inform the near-term protection and  
25 restoration efforts. The natural community restoration and protection activities are expected to be  
26 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
27 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are  
28 more than sufficient to support the conclusion that the near-term effects of Alternative 1A would be  
29 not be adverse under NEPA, because the number of acres required to meet the typical ratios  
30 described above would be only 282 acres of aquatic communities restored and 4,520 acres of upland  
31 communities protected.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
37 *Communities*, *AMM16 Giant Garter Snake*, and *AMM37 Recreation*. All of these AMMs include  
38 elements that avoid or minimize the risk of BDCP activities affecting habitats and species adjacent to  
39 work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance*  
40 *and Minimization Measures*.

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

42 The habitat model indicates that the study area supports approximately 31,281 acres of aquatic and  
43 53,285 acres of upland habitat for giant garter snake. Alternative 1A as a whole would result in the  
44 permanent loss of and temporary effects on 624 acres of aquatic habitat and to 3,278 acres of

1 upland habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat in  
2 the study area and 6% of the total upland habitat in the study area). The locations of these losses are  
3 described above in the analyses of individual conservation measures.

4 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
5 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
6 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
7 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
8 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
9 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
10 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
11 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
12 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value would  
13 be protected and restored for the giant garter snake under Objective GGS3.1 to achieve a 1:1 ratio of  
14 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
15 lost due to late season flooding in Yolo Bypass as a result of CM2) (Objective GGS3.1). In addition to  
16 the 6,540 acres of high value habitat targeted specifically for giant garter snake, the protection and  
17 restoration of other natural communities is expected to provide additional restoration of 4,430  
18 acres and protection of 3,733 acres of garter snake habitat.

19 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
20 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
21 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
22 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
23 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
24 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
25 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

26 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
27 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
28 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
29 connectivity between protected areas, is considered the most effective approach to giant garter  
30 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
31 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
32 and are identified as important for the recovery of the species in the draft recovery plan for the  
33 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
34 habitat would focus on these two important subpopulations.

35 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
36 and protection actions discussed above, as well as the restoration of managed wetland, nontidal  
37 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal freshwater emergent  
38 wetland, alkali seasonal wetland, grassland, and vernal pool complex that could overlap with the  
39 species model, would result in the restoration of 3,450 acres of aquatic and 980 acres of upland  
40 modeled habitat for giant garter snake. In addition, protection of cultivated land, grassland, alkali  
41 seasonal wetland, and vernal pool complex could overlap with the species model and would result in  
42 the protection of 1,547 acres of aquatic and 2,185 acres of upland giant garter snake modeled  
43 habitat.

1 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 1A would not  
2 be adverse because the BDCP has committed to protecting and restoring the acreage required to  
3 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter  
4 snake associated with Alternative 1A, in the absence of other conservation actions, would represent  
5 an adverse effect as a result of habitat modification and potential direct mortality of a special-status  
6 species. However, with habitat protection and restoration associated with the conservation  
7 components, guided by landscape-scale goals and objectives and by AMM1–AMM7, AMM10, AMM16,  
8 and AMM37, the effects of Alternative 1A as a whole on giant garter snake would not be adverse.

9 **CEQA Conclusion:**

10 **Near-Term Timeframe**

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

15 Alternative 1A would permanently and temporarily remove 282 acres of aquatic habitat and 2,260  
16 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
17 would result from the construction of the water conveyance facilities (CM1, 88 acres of aquatic and  
18 574 acres of upland habitat), from Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic  
19 and 458 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres  
20 of upland habitat), and from Conservation Hatcheries (CM18, 35 acres of upland habitat). The  
21 aquatic habitat losses would occur in tidal and nontidal wetland natural communities and rice fields.  
22 The upland habitat losses would occur in cropland and grassland communities. In addition,  
23 approximately 84 miles of irrigation and drainage channels providing giant garter snake movement  
24 habitat would be removed. The habitat model likely overestimates the relative value of irrigation  
25 and drainage canals in the vicinity of White Slough and south due to its proximity to records that  
26 likely represent single displaced snakes, not viable populations.

27 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
28 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
29 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
30 of upland habitats. Using these ratios would indicate that 282 acres of aquatic habitat should be  
31 restored, 282 acres of aquatic habitat should be protected, and 4,520 acres of upland habitat should  
32 be protected for giant garter snake to mitigate the near-term losses.

33 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to  
34 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to  
35 be protected and restored in the near term specifically for the giant garter snake total 3,900 acres  
36 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least  
37 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
38 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900  
39 acres under Objective GGS3.1) would be restored or protected to create connections from the  
40 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.  
41 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected  
42 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
43 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
44 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage

1 ditches located in cultivated lands and suitable for giant garter snake movement would be  
2 maintained and protected within the reserve system, which would include isolated valley oak trees,  
3 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
4 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

5 These habitat protection and restoration measures would benefit the giant garter snake and the  
6 plan's species-specific biological goals and objectives would inform the near-term protection and  
7 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
8 providing connectivity between protected areas, is considered the most effective approach to giant  
9 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
10 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
11 are identified as important for the recovery of the species in the draft recovery plan for the species  
12 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
13 would focus on these two important subpopulations.

14 The natural community restoration and protection activities are expected to be concluded during  
15 the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts  
16 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient  
17 to support the conclusion that the near-term effects of Alternative 1A would be less than significant  
18 under CEQA, because the number of acres required to meet the typical ratios described above would  
19 be only 282 acres of aquatic communities restored, 282 acres of aquatic communities protected, and  
20 4,520 acres of upland communities protected.

21 The Plan also includes commitments to implement AMM1-AMM7, AMM10, AMM16, and AMM37. All  
22 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats  
23 and species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
24 Appendix 3.C, *Avoidance and Minimization Measures*.

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

26 The habitat model indicates that the study area supports approximately 31,281 acres of aquatic and  
27 53,285 acres of upland habitat for giant garter snake. Alternative 1A as a whole would result in the  
28 permanent loss of and temporary effects on 624 acres of aquatic habitat and to 3,278 acres of  
29 upland habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat in  
30 the study area and 6% of the total upland habitat in the study area). The locations of these losses are  
31 described above in the analyses of individual conservation measures.

32 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
33 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
34 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
35 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
36 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
37 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
38 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
39 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
40 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value would  
41 be protected and restored for the giant garter snake under Objective GGS3.1 to achieve a 1:1 ratio of  
42 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
43 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of  
44 high value habitat targeted specifically for giant garter snake, the protection and restoration of other

1 natural communities is expected to provide additional restoration of 4,430 acres and protection of  
2 3,733 acres of garter snake habitat.

3 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
4 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
5 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
6 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
7 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
8 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
9 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

10 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
11 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
12 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
13 connectivity between protected areas, is considered the most effective approach to giant garter  
14 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
15 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
16 and are identified as important for the recovery of the species in the draft recovery plan for the  
17 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
18 habitat would focus on these two important subpopulations.

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
20 and protection actions discussed above, as well as the restoration of managed wetland, nontidal  
21 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal freshwater emergent  
22 wetland, alkali seasonal wetland, grassland, and vernal pool complex that could overlap with the  
23 species model, would result in the restoration of 3,450 acres of aquatic and 980 acres of upland  
24 modeled habitat for giant garter snake. In addition, protection of cultivated land, grassland, alkali  
25 seasonal wetland, and vernal pool complex could overlap with the species model and would result in  
26 the protection of 1,547 acres of aquatic and 2,185 acres of upland giant garter snake modeled  
27 habitat. The BDCP also includes AMM1–AMM7, AMM10, AMM16, and AMM37, all of which are  
28 directed at minimizing or avoiding potential impacts on adjacent habitats during construction and  
29 operation of the conservation measures.

30 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
31 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to  
32 construction and restoration activities, implementation of Alternative 1A as a whole would not  
33 result in a substantial adverse effect through habitat modifications and would not substantially  
34 reduce the number or restrict the range of the giant garter snake. Therefore, the loss of giant garter  
35 snake habitat and potential mortality of snakes would have a less-than-significant impact on giant  
36 garter snake under CEQA.

### 37 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

38 Construction activities outside the project footprint but within 200 feet of construction associated  
39 with water conveyance facilities, conservation components and ongoing habitat enhancement, as  
40 well as operation and maintenance of above-ground water conveyance facilities, including the  
41 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized  
42 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of  
43 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,  
44 AMM16, and 37, which would be in effect throughout the plan's construction phase.



1 The use of mechanical equipment during water conveyance facilities construction could cause the  
2 accidental release of petroleum or other contaminants that could affect giant garter snake or its  
3 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake  
4 habitat could also have a negative effect on the species or its prey. AMM1-AMM6 would minimize  
5 the likelihood of such spills occurring and would ensure measures are in place to prevent runoff  
6 from the construction area and potential effects of sediment or dust on giant garter snake or its  
7 prey.

8 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species  
9 that feed on aquatic species, including giant garter snake. The operational impacts of new flows  
10 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.  
11 Results indicated that changes in total mercury levels in water and fish tissues due to future  
12 operational conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and  
13 5D.4-5).

14 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
15 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
16 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
17 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase  
18 bioavailability of mercury. Increased methylmercury associated with natural community and  
19 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,  
20 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their  
21 larvae, carp, and mosquitofish. In general, the highest methylation rates are associated with high  
22 tidal marshes that experience intermittent wetting and drying and associated anoxic conditions  
23 (Alpers et al. 2008). Along with avoidance and minimization measures and adaptive management  
24 and monitoring, *CM12 Methylmercury Management* is expected to reduce the amount of  
25 methylmercury resulting from the restoration of natural communities and floodplains.

26 Extant populations of giant garter snake within the study area are known only from the upper Yolo  
27 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury  
28 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low  
29 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent  
30 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough  
31 giant garter snake population. Effects on giant garter snake from increased methylmercury  
32 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and  
33 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury  
34 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,  
35 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.  
36 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase  
37 methylmercury production, although production would be minimized by *CM12 Methylmercury*  
38 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not  
39 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to  
40 decrease risk to the giant garter snake, although snakes could prey on individuals that have been  
41 exposed to methylmercury during the previous season.

42 The potential mobilization or creation of methylmercury within the study area varies with site-  
43 specific conditions and will need to be assessed at the project level. Measures described in *CM12*  
44 *Methylmercury Management* include provisions for project-specific Mercury Management Plans.  
45 Along with avoidance and minimization measures and adaptive management and monitoring, *CM12*

1 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and  
2 floodplain restoration on giant garter snake.

3 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1A  
4 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or  
5 through habitat modifications. These AMMs would also avoid and minimize effects that could  
6 substantially reduce the number of giant garter snakes or restrict the species' range. Therefore, the  
7 indirect effects of Alternative 1A would not have an adverse effect on giant garter snake.

8 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
9 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and  
10 upland habitats. The use of mechanical equipment during construction could cause the accidental  
11 release of petroleum or other contaminants that could impact giant garter snake or its prey. The  
12 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also  
13 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,  
14 AMM16, and 37 as part of Alternative 1A construction, operation and maintenance, the BDCP would  
15 avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or through  
16 habitat modifications. Alternative 1A would not result in a substantial reduction in numbers or a  
17 restriction in the range of giant garter snakes. Therefore, the indirect effects of BDCP Alternative 1A  
18 would have a less-than-significant impact on giant garter snakes.

19 Giant garter snake could experience indirect effects from increased exposure to methylmercury as a  
20 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects  
21 of methylmercury would not result in a substantial reduction in numbers or a restriction in the  
22 range of giant garter snakes, and, therefore, would have a less-than-significant impact on giant  
23 garter snakes.

#### 24 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 25 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

26 Implementation of Alternative 1A would not introduce a substantial barrier to the movement among  
27 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife  
28 Refuge, and the Delta in the study area.

29 **NEPA Effects:** Alternative 1A would not adversely affect connectivity among giant garter snakes in  
30 the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta  
31 in the study area.

32 **CEQA Conclusion:** Alternative 1A would have a less-than-significant impact on connectivity between  
33 giant garter snakes in the study area.

#### 34 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of** 35 **Implementation of Conservation Components**

36 **CM2 Yolo Bypass Fisheries Enhancement:** The proposed changes in Fremont Weir operations will  
37 occur intermittently from as early as mid-November through as late as mid-May. The core  
38 operations will occur during the winter/spring period, which corresponds mostly with the giant  
39 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter  
40 snakes that occur in the bypass during the active season could potentially overwinter in the bypass  
41 during the inactive season: these snakes may be vulnerable to inundation of the bypass and could be  
42 drowned or displaced from overwintering sites. However, most typically, Fremont Weir "notch"

1 operations will occur on the shoulders of time periods in which the Sacramento River rises enough  
2 for Fremont Weir to overtop passively, without the proposed project. Project-associated inundation  
3 of areas that would not otherwise have been inundated is expected to occur in no more than 30% of  
4 all years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and  
5 during those years notch operations would not typically affect the maximum extent of inundation.  
6 Currently, in more than half of all years, an area greater than the area that would be inundated as a  
7 result of covered activities is already inundated during the snake's inactive season (Kirkland pers.  
8 comm.). Duration of inundation may also be an important factor determining effects on  
9 overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes  
10 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of  
11 inundation the snakes can survive while overwintering in their burrows.

12 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to  
13 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation  
14 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres  
15 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch  
16 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high value habitat and 514  
17 acres of moderate value habitat.

18 As noted above under the discussion of habitat loss from construction-related activities in Yolo  
19 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic  
20 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662  
21 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter  
22 Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss  
23 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of  
24 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1  
25 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded  
26 and rice lost due to late season flooding in Yolo Bypass as a result of CM2).

27 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland  
28 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated  
29 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing  
30 levees would be breached and the newly constructed setback levees will be inundated through  
31 seasonal flooding. The restored floodplain will include a range of elevations from low-lying areas  
32 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,  
33 every 10 years or more). There are no records of giant garter snakes in the vicinity of where  
34 floodplain restoration is expected to occur.

35 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285  
36 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake  
37 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic  
38 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

39 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with  
40 implementing Alternative 1A are not expected to result in substantial adverse effects on giant garter  
41 snakes, either directly or through habitat modifications, as it would not result in a substantial  
42 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 1A  
43 would not adversely affect the species.

1 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in  
2 various parts of the study area would periodically affect a total of approximately 2,008 acres of  
3 upland habitat for giant garter snake. The inundation could affect overwintering snakes. Project-  
4 associated inundation of areas that would not otherwise have been inundated is expected to occur in  
5 no more than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated  
6 70% of all years, and during those years notch operations would not typically affect the maximum  
7 extent of inundation. Currently, in more than half of all years, an area greater than the area that  
8 would be inundated as a result of covered activities is already inundated during the snake's inactive  
9 season (Kirkland pers. comm.). Therefore, increased inundation in the Yolo Bypass as a result of  
10 BDCP is expected to have a minimal effect on the Yolo Basin/Willow Slough population.  
11 Implementing Alternative 1A, including AMM1–AMM7, AMM10, and AMM16, would not be expected  
12 to result in substantial adverse effects on giant garter snakes, either directly or through habitat  
13 modifications, because it would not result in a substantial reduction in numbers or a restriction in  
14 the range of giant garter snakes. Periodic inundation under Alternative 1A would have a less-than-  
15 significant impact on the species.

### 16 **Western Pond Turtle**

17 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland  
18 nesting and overwintering habitat. Further details regarding the habitat model, including  
19 assumptions on which the model is based, are provided in BDCP Appendix 2.A, Section 2A.30,  
20 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,  
21 including upland habitat in natural communities as well as upland in agricultural areas adjacent to  
22 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors  
23 considered in assessing the value of affected aquatic habitat are natural community type and  
24 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in  
25 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to  
26 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on  
27 effects on dispersal habitat because, although dispersal habitat is important for maintaining and  
28 increasing distribution and genetic diversity, turtles have been known to travel over many different  
29 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal  
30 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-  
31 value aquatic and nesting and overwintering habitat.

32 Construction and restoration associated with Alternative 1A conservation measures would result in  
33 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table  
34 12-1A-23. The majority of these losses would take place over an extended period of time as tidal  
35 marsh is restored in the study area. Full implementation of Alternative 1A would also include the  
36 following biological objectives over the term of the BDCP to benefit the western pond turtle (BDCP  
37 Chapter 3, *Conservation Strategy*).

- 38 ● Protect or restore 142,200 acres of high-value natural communities and covered species  
39 habitats (Objective L1.1, associated with CM3).
- 40 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
41 accommodate sea level rise. Minimum restoration targets for tidal natural communities in  
42 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in  
43 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA  
44 (Objective L1.3, associated with CM2, CM3, and CM4).

- 1       ● Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),  
2       include sufficient transitional uplands along the fringes of restored brackish and freshwater  
3       tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow  
4       for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,  
5       associated with CM3, CM4, and CM8).
- 6       ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
7       recolonization of vegetation, desirable natural community vegetation is regenerated, and  
8       structural diversity is promoted, or implement management actions that mimic those natural  
9       disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 10      ● Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 11      ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
12      tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
13      TFEWNC1.1, associated with CM3 and CM4).
- 14      ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
15      and nontidal freshwater emergent wetland natural communities, with suitable habitat  
16      characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
17      associated with CM3 and CM10).
- 18      ● Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly  
19      Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 20      ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 21      ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
22      breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
23      CM3).
- 24      ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
25      lands that occur in cultivated lands within the reserve system, including isolated valley oak  
26      trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
27      water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
28      with CM3 and CM11).
- 29      As explained below, with the restoration and protection of these amounts of habitat, in addition to  
30      implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes  
31      and would be less than significant for CEQA purposes.

1 **Table 12-1A-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 1A<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic (acres)	49	49	79	79	NA	NA
	Upland <sup>e</sup> (acres)	161	161	58	58	NA	NA
	Aquatic (miles)	11	11	5	5		
<b>Total Impacts CM1 (acres)</b>		<b>210</b>	<b>210</b>	<b>137</b>	<b>137</b>		
CM2–CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres)	414	1,028	119	136	283-798	331
	Aquatic (miles)	25	109	3	4		
<b>Total Impacts CM2–CM18 (acres)</b>		<b>496</b>	<b>1,142</b>	<b>142</b>	<b>180</b>	<b>283–798</b>	<b>331</b>
<b>TOTAL IMPACTS CM1–CM18 (acres)</b>		<b>706</b>	<b>1,352</b>	<b>279</b>	<b>317</b>		<b>479</b>

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

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

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

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

<sup>e</sup> Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

4 Alternative 1A conservation measures would result in the permanent and temporary loss of up to  
5 286 acres of aquatic habitat and 1,383 acres of upland nesting and overwintering habitat (Table 12-  
6 1A-23). There are 6 western pond turtle occurrences that overlap with the CM1 footprint and a  
7 number of additional occurrences in the vicinity (Figure 12-16). Activities that would result in the  
8 temporary and permanent loss of western pond turtle modeled habitat are conveyance facilities and  
9 transmission line construction, and establishment and use of RTM, borrow, and spoils areas (CM1),  
10 Yolo Bypass improvements (CM2), tidal habitat restoration (CM4) and seasonally inundated  
11 floodplain restoration (CM5), and riparian restoration (CM7). Habitat enhancement and  
12 management activities (CM11), such as ground disturbance or removal of nonnative vegetation,  
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
15 degrade or eliminate western pond turtle habitat. The activity accounting for most (80%) of the  
16 habitat loss or conversion would be *CM4 Tidal Natural Communities Restoration*. Each of these  
17 individual activities is described below. A summary statement of the combined impacts and NEPA  
18 effects and a CEQA conclusion follow the individual conservation measure discussions.

1 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
2 result in the permanent loss of approximately 49 acres of aquatic habitat and 161 acres of  
3 upland nesting and overwintering habitat for the western pond turtle in the study area (Table  
4 12-1A-23). Development of the water conveyance facilities would also result in the temporary  
5 removal of up to 79 acres of aquatic habitat and 58 acres of nesting and overwintering habitat  
6 for the western pond turtle in the study area (see Table 12-1A-23). Approximately 11 miles of  
7 channels providing western pond turtle movement habitat would be removed as a result of  
8 floodplain restoration and 5 miles would be temporarily disturbed. There are six western pond  
9 turtle occurrences that overlap with the CM1 footprint in CZ 2 around Clifton Court Forebay and  
10 in CZ 5 scattered throughout the Delta. The majority of the permanent loss of aquatic habitat  
11 and nesting and overwintering habitat would be near Clifton Court Forebay in CZ 8. Refer to the  
12 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations. The  
13 aquatic habitat in the Clifton Court Forebay area is considered to be of reasonably high-value  
14 because it consists of agricultural ditches in or near known species occurrences. The nesting and  
15 overwintering and dispersal habitat that would be lost consists primarily of cultivated lands  
16 with some small portion of ruderal grassland habitat. Except for remnant, uncultivated patches,  
17 the cultivated lands are not suitable for nesting and overwintering unless left fallow.  
18 Construction of the water conveyance facilities would also affect dispersal habitat, which is  
19 primarily cultivated lands. While there are western pond turtle occurrences scattered  
20 throughout CZ 3, CZ 4, CZ 5, and CZ 6, this effect is widely dispersed because of the long, linear  
21 nature of the pipeline footprint.

22 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
23 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres  
24 of upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles  
25 of channels providing western pond turtle movement habitat would be permanently or  
26 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDB  
27 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in  
28 the Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2013).

29 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
30 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting  
31 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of  
32 channels providing western pond turtle movement habitat would be removed as a result of  
33 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions  
34 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat  
35 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse  
36 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create  
37 suitable, slow-moving freshwater slough and marsh habitat.

38 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent  
39 wetland, and managed wetland as habitat most of the Suisun Marsh pond turtle observations  
40 have been in the interior drainage ditches or near water control structures not hydrologically  
41 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an  
42 aquatic class type called *drainage ditches* and therefore an effect on this habitat type cannot be  
43 calculated, it is likely that this general type of habitat accounts for a very small portion of the  
44 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the  
45 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering  
46 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely

1 function as the primary nesting and overwintering habitat. The nesting and overwintering  
2 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is  
3 adjacent to undeveloped grassland habitat.

4 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting  
5 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-  
6 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.  
7 Because the estimates of the effect of tidal inundation are based on projections of where  
8 restoration may occur, actual effects are expected to be lower because sites would be selected to  
9 minimize effects on western pond turtle habitat (see AMM17 in BDCP Appendix 3.C, *Avoidance*  
10 *and Minimization Measures*).

- 11 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
12 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
13 approximately 53 acres of aquatic habitat 33 acres of upland habitat for western pond turtle.  
14 Approximately 3 miles of channels providing western pond turtle movement habitat would be  
15 removed or temporarily disturbed as a result of floodplain restoration. Although there are no  
16 CNDDDB occurrences of the western pond turtle in the areas where floodplain restoration is  
17 likely to occur, the species is known to occur along the San Joaquin River to the south in the San  
18 Joaquin River National Wildlife Refuge. As with CM4, the estimates of the effect of seasonal  
19 floodplain levee construction and inundation are based on projections of where restoration may  
20 occur. Actual effects are expected to be lower because sites would be selected to minimize  
21 effects on western pond turtle habitat.

- 22 • *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural  
23 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of  
24 upland nesting and overwintering habitat for western pond turtle.

- 25 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
26 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
27 habitats may result in localized ground disturbances that could temporarily remove small  
28 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of  
29 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
30 minor adverse effects on available western pond turtle habitat and are expected to result in  
31 overall improvements to and maintenance of western pond turtle habitat values over the term  
32 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.

33 Management of the 6,600 acres of managed wetlands to be protected for waterfowl and  
34 shorebirds is not expected to result in overall adverse effects for the western pond turtle.  
35 Management actions that would improve wetland quality and diversity on managed wetlands  
36 include control and eradication of invasive plants; maintenance of a diversity of vegetation types  
37 and elevations, including upland areas to provide flood refugia; water management and leaching  
38 to reduce salinity; and enhancement of water management infrastructure (improvements to  
39 enhance drainage capacity, levee maintenance). These management actions could potentially  
40 benefit the western pond turtle. The 6,600 acres of protected managed wetlands would be  
41 monitored and adaptively managed to ensure that management options are implemented to  
42 avoid adverse effects on the western pond turtle.

- 43 • *Operations and maintenance*: Ongoing maintenance of BDCP facilities is expected to have little if  
44 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of  
45 the above-ground water conveyance facilities and restoration infrastructure could result in



1 ongoing but periodic disturbances that could affect western pond turtle use where there is  
2 suitable habitat in the study area. Maintenance activities would include vegetation management,  
3 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
4 however, would be minimized by AMMs and conservation actions described below.

- 5 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of  
6 western pond turtles. If turtles reside where conservation measures are implemented (most  
7 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land  
8 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,  
9 enhancement, and management could result in injury or mortality of western pond turtles.  
10 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable  
11 aquatic or upland habitat for the western pond turtle, and turtles found would be relocated  
12 outside the construction areas, as required by the AMMs listed below.

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

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

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

21 Alternative 1A would temporarily and permanently remove 233 acres of aquatic habitat and 752  
22 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These  
23 effects would result from water conveyance facilities construction (CM1, 128 acres of aquatic and  
24 219 acres of upland habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of  
25 upland habitat), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat,  
26 and riparian restoration (CM7, 4 acres of upland habitat). All effects for seasonally inundated habitat  
27 restoration (CM5) would occur in the late-longterm.

28 Typical project-level mitigation ratios for those natural communities that would be affected and that  
29 are identified in the biological goals and objectives for western pond turtle in Chapter 3 of the BDCP  
30 would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection of  
31 upland habitats. Using these ratios would indicate that 233 acres of aquatic habitat should be  
32 restored, 233 acres of aquatic habitat should be protected, and 1,504 acres of upland habitat should  
33 be protected for western pond turtle to mitigate the near-term losses.

34 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
35 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
36 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
37 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
38 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
39 Objective NFEW/NPANC1.1, Objective MWNC1.1) and up to 2,000 acres of upland habitat (Objective  
40 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
41 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
42 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,

1 undisturbed grassland. Additionally, basking platforms would be installed as needed in restored  
2 freshwater marsh to benefit the western pond turtle.

3 The natural community restoration and protection activities would be concluded in the first 10  
4 years of Plan implementation, which is close enough in time to the impacts of construction to  
5 constitute adequate mitigation. Because the number of acres required to meet the typical ratios  
6 described above would be only 233 acres of aquatic communities protected and restored and 1,504  
7 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of upland  
8 habitats restored or created in the near-term Plan goals, and the additional detail in the biological  
9 goals for western pond turtle, are more than sufficient to support the conclusion that the near-term  
10 impacts of habitat loss and direct mortality under Alternative 1A on western pond turtles would not  
11 be adverse.

12 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
16 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM17 Western*  
17 *Pond Turtle*. These AMMs include elements that would avoid or minimize the risk of affecting  
18 habitats and species adjacent to work areas and storage sites. The AMMs are described in detail in  
19 BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 20 **Late Long-Term Timeframe**

21 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and  
22 28,864 acres of upland habitat for western pond turtle. Alternative 1A would remove 286 acres of  
23 aquatic habitat and 1,383 acres of upland nesting and overwintering habitat for western pond turtle  
24 in the late long-term.

25 Implementation of Alternative 1A as a whole would increase the extent and distribution of high-  
26 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study  
27 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this  
28 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be  
29 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond  
30 turtle.

31 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
32 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
33 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
34 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
35 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
36 L1.3, Objective NFEW/NPANC1.1, Objective MWNC1.1) and up to 8,000 acres of upland habitat  
37 (Objective GNC1.1). In addition, the protection and management of existing managed wetland  
38 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration  
39 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent  
40 to protected, undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands  
41 that are preserved and managed as part of the 48,625 acres of protected cultivated lands described  
42 above for giant garter snake are also expected to benefit the species. Additionally, basking platforms  
43 will be installed as needed in restored freshwater marsh to benefit the western pond turtle.

1 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
2 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
3 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
4 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
5 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
6 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
7 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
8 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
9 rabbit.

10 The study area represents only a small portion of the range of the western pond turtle in California  
11 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
12 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
13 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
14 western pond turtle because for the following reasons.

- 15 • The study area represents a small portion of the species' entire range.
- 16 • Only 1% of the habitat in the study area would be removed or converted.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
18 and protection actions discussed above, as well as the restoration of managed wetland, nontidal  
19 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal brackish emergent  
20 wetland, tidal freshwater emergent wetland, grassland, valley foothill riparian, that could overlap  
21 with the species model, would result in the restoration of 29,738 acres of aquatic and 1,421 acres of  
22 upland modeled habitat for western pond turtle. In addition, protection of cultivated land, managed  
23 wetland, grassland, and valley/foothill riparian could overlap with the species model and would  
24 result in the protection of 1,281 acres of aquatic and 4,993 acres of upland western pond turtle  
25 modeled habitat.

26 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 1A would  
27 not be adverse because the BDCP has committed to protecting and restoring the acreage required to  
28 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond  
29 turtle habitat associated with Alternative 1A, in the absence of other conservation actions, would  
30 represent an adverse effect as a result of habitat modification and potential direct mortality of a  
31 special-status species. However, with habitat protection and restoration associated with the  
32 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
33 AMM10, and AMM17, the effects of Alternative 1A as a whole on western pond turtle would not be  
34 adverse.

### 35 **CEQA Conclusion:**

#### 36 **Near-Term Timeframe**

37 Because *CM1 Water Facilities and Operation* construction is being evaluated at the project level, the  
38 near-term BDCP conservation strategy has been evaluated to determine whether it would provide  
39 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
40 construction would be less than significant under CEQA.

41 Alternative 1A would temporarily and permanently remove 233 acres of aquatic habitat and 752  
42 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These

1 effects would result from water conveyance facilities construction (CM1, 128 acres of aquatic and  
2 219 acres of upland habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of  
3 upland habitat), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat,  
4 and riparian restoration (CM7, 4 acres of upland habitat). All effects for seasonally inundated habitat  
5 restoration (CM5) would occur in the late-longterm.

6 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
7 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3 of  
8 the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for  
9 protection of upland habitats. Using these ratios would indicate that 233 acres of aquatic habitat  
10 should be restored, 233 acres of aquatic habitat should be protected, and 1,504 acres of upland  
11 habitat should be protected for western pond turtle to mitigate the near-term losses.

12 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
13 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
14 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
15 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
16 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
17 Objective NFEW/NPANC1.1, Objective MWNC1.1) and up to 2,000 acres of upland habitat (Objective  
18 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
19 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
20 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
21 undisturbed grassland. Additionally, basking platforms would be installed as needed in restored  
22 freshwater marsh to benefit the western pond turtle.

23 The natural community restoration and protection activities would be concluded in the first 10  
24 years of Plan implementation, which is close enough in time to the impacts of construction to  
25 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet  
26 the typical ratios described above would be only 233 acres of aquatic communities protected and  
27 restored and 1,504 acres of upland communities protected, the 24,350 acres of aquatic and 2,000  
28 acres of upland habitats restored or created in the near-term Plan goals, and the additional detail in  
29 the biological goals for western pond turtle, are more than sufficient to support the conclusion that  
30 the near-term impacts of habitat loss and direct mortality under Alternative 1A on western pond  
31 turtles would be less than significant.

32 In addition, the plan also contains commitments to implement AMM1–AMM6, AMM10, and AMM17  
33 which include elements that would avoid or minimize the risk of directly and indirectly affecting  
34 habitats and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
35 Appendix 3.C, *Avoidance and Minimization Measures*.

### 36 ***Late Long-Term Timeframe***

37 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and  
38 28,864 acres of upland habitat for western pond turtle. Alternative 1A would remove 286 acres of  
39 aquatic habitat and 1,383 acres of upland nesting and overwintering habitat for western pond turtle  
40 in the late long-term.

41 Implementation of Alternative 1A as a whole would increase the extent and distribution of high-  
42 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study  
43 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this

1 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be  
2 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond  
3 turtle.

4 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
5 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
6 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
7 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
8 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
9 L1.3, Objective NFEW/NPANC1.1, Objective MWNC1.1) and up to 8,000 acres of upland habitat  
10 (Objective GNC1.1). In addition, the protection and management of existing managed wetland  
11 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration  
12 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent  
13 to protected, undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands  
14 that are preserved and managed as part of the 48,625 acres of protected cultivated lands described  
15 above for giant garter snake are also expected to benefit the species. Additionally, basking platforms  
16 will be installed as needed in restored freshwater marsh to benefit the western pond turtle.

17 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
18 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
19 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
20 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
21 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
22 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
23 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
24 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
25 rabbit.

26 The study area represents only a small portion of the range of the western pond turtle in California  
27 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
28 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
29 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
30 western pond turtle because for the following reasons.

- 31 ● The study area represents a small portion of the species' entire range.
- 32 ● Only 1% of the habitat in the study area would be removed or converted.

33 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
34 and protection actions discussed above, as well as the restoration of managed wetland, nontidal  
35 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal brackish emergent  
36 wetland, tidal freshwater emergent wetland, grassland, valley foothill riparian, that could overlap  
37 with the species model, would result in the restoration of 29,738 acres of aquatic and 1,421 acres of  
38 upland modeled habitat for western pond turtle. In addition, protection of cultivated land, managed  
39 wetland, grassland, and valley/foothill riparian could overlap with the species model and would  
40 result in the protection of 1,281 acres of aquatic and 4,993 acres of upland western pond turtle  
41 modeled habitat.

42 The loss of western pond turtle habitat associated with Alternative 1A as a whole would represent  
43 an adverse effect as a result of special-status species habitat modification and the potential direct  
44 mortality of turtles. However, considering the habitat restoration and protection associated with the

1 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
2 AMM10, and AMM17, which would be in place throughout the construction phase, the loss of habitat  
3 and potential mortality would not have an adverse effect on western pond turtle. Therefore, the loss  
4 of western pond turtle habitat and potential mortality of turtles resulting from Alternative 1A would  
5 have a less-than-significant impact on western pond turtle.

### 6 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

7 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily  
8 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the  
9 western pond turtle. Construction activities outside the construction footprint but within 200 feet of  
10 water conveyance facilities, conservation components and ongoing habitat enhancement, as well as  
11 operation and maintenance of above-ground water conveyance facilities, including the transmission  
12 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on  
13 western pond turtle habitat, and temporary noise and visual disturbances over the term of the  
14 BDCP.

15 The use of mechanical equipment during water conveyance facilities construction could cause the  
16 accidental release of petroleum or other contaminants that could affect western pond turtle or its  
17 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond  
18 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and  
19 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to  
20 prevent runoff from the construction area and potential effects of sediment or dust on western pond  
21 turtle or its prey.

22 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be  
23 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the  
24 salinity of water in Suisun Marsh will generally increase as a result of water operations and  
25 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full  
26 implementation of the BDCP show salinity to double by the late long-term compared with current  
27 conditions during late fall and winter months. Changes in salinity would not be uniform across  
28 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than  
29 others, and most of the salinity increase would occur during the fall and winter. Western pond  
30 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and  
31 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh  
32 pond turtle observations have been in the interior drainage ditches or near water control structures  
33 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity  
34 would occur. Therefore, the potential effects associated with changes in salinity are not expected to  
35 adversely affect western pond turtles

36 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17, Alternative 1A would  
37 avoid the potential for substantial adverse effects on western pond turtles, either directly or through  
38 habitat modifications. These AMMs would also avoid and minimize effects that could substantially  
39 reduce the number of western pond turtles or restrict the species range. Therefore, the indirect  
40 effects of Alternative 1A would not have an adverse effect on western pond turtle.

41 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance  
42 as well as construction-related noise and visual disturbances could impact western pond turtle in  
43 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
44 accidental release of petroleum or other contaminants that could affect western pond turtle or its

1 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle  
2 habitat could also have a negative effect on the species or its prey. Changes in water salinity would  
3 have a less-than-significant impact on western pond turtles because most of the salinity increases  
4 would occur in areas not used extensively by western pond turtles. With implementation of AMM1–  
5 AMM6, AMM10, and AMM17 as part of Alternative 1A construction, operation, and maintenance, the  
6 BDCP would avoid the potential for substantial adverse effects on western pond turtles, either  
7 indirectly or through habitat modifications, and would not result in a substantial reduction in  
8 numbers or a restriction in the range of western pond turtles. The indirect effects of BDCP  
9 Alternative 1A would have a less-than-significant impact on western pond turtles.

10 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of**  
11 **Implementation of Conservation Components**

12 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect  
13 western pond turtle and its upland habitat. BDCP Appendix 5.J, *Effects on Natural Communities,*  
14 *Wildlife, and Plants*, provides the method used to estimate periodic inundation effects in the Yolo  
15 Bypass. Based on this method, periodic inundation could affect from an estimated 283 acres of  
16 habitat during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow.  
17 This effect would occur during an estimated maximum of 30% of years, in areas that are already  
18 inundated in more than half of all years; therefore, these areas are expected to provide only  
19 marginal overwintering habitat for the western pond turtle under Existing Conditions. Furthermore,  
20 Yolo Bypass inundation is not expected to affect nesting western pond turtles because operations  
21 would not occur during the nesting season (approximately May through October). Therefore, Yolo  
22 Bypass operations are expect to have a minimal effect, if any, on western pond turtles in the Yolo  
23 Bypass.

24 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland  
25 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored  
26 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat  
27 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not  
28 expected to be inundated during the nesting season, however, turtle hatchlings may overwinter in  
29 the nest and could be affected by flooding. Restored floodplains would transition for areas that flood  
30 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);  
31 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,  
32 where frequent flooding occurs.

33 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5  
34 associated with implementing Alternative 1A are not expected to result in substantial adverse  
35 effects either directly or through habitat modifications, as it would not result in a substantial  
36 reduction in numbers or a restriction in the range of western pond turtles. Therefore, Alternative 1A  
37 would not adversely affect the species.

38 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in  
39 various parts of the study area would periodically affect 283-798 acres from CM2 and approximately  
40 331 acres from CM5 of upland habitat for western pond turtle. These acreages represent only 1% of  
41 the total upland western pond turtle habitat in the study area. Most of the increase in inundation  
42 would occur in the winter and early spring months, when western pond turtles may be in the water  
43 or overwintering and occupying upland habitats. Therefore, implementing Alternative 1A, including  
44 AMM1–AMM6, AMM10, and AMM17, would not be expected to result in substantial adverse effects

1 on western pond turtle, either directly or through habitat modifications, because it would not result  
2 in a substantial reduction in numbers or a restriction in the range of western pond turtles. Periodic  
3 effects of inundation under Alternative 1A would have a less-than-significant impact on the species.

#### 4 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville's Horned Lizard**

5 This section describes the effects of Alternative 1A on the silvery legless lizard, San Joaquin  
6 coachwhip, and Blainville's horned lizard (special-status reptiles). The habitat types used to assess  
7 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),  
8 which would not be affected by construction or restoration activities. This species is not discussed  
9 any further.

10 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland  
11 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and  
12 West Canal (CZ 8). The habitat types used to assess effects on the Blainville's horned lizard are the  
13 same as those for the coachwhip in CZ 7 and CZ 8. There is also potential habitat for the horned  
14 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San  
15 Joaquin coachwhip and Blainville's horned lizard extends into the study area, there are no records  
16 for either of these species within the study area (California Department of Fish and Wildlife 2013

17 Alternative 1A is expected to result in the temporary and permanent removal of habitat that special-  
18 status reptiles uses for cover and dispersal (Table 12-1A-24). BDCP actions that could affect this  
19 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity  
20 of Clifton Court Forebay, and grassland restoration, protection and management. Full  
21 implementation of Alternative 1A would also include the following biological objectives over the  
22 term of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation*  
23 *Strategy*).

- 24 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
25 between existing conservation lands (Objective L1.6, associated with CM3).
- 26 ● Increase native species diversity and relative cover of native plant species, and reduce the  
27 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 28 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
29 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
30 associated with CM3, CM8, and CM11).
- 31 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 32 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
33 (Objective GNC1.2, associated with CM3 and CM8).

34 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
35 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA  
36 purposes and would be less than significant for CEQA purposes.



1 **Table 12-1A-24. Changes in Special-Status Reptile Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	171	171	167	167	NA	NA
<b>Total Impacts CM1</b>		<b>171</b>	<b>171</b>	<b>167</b>	<b>167</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Grassland	0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>171</b>	<b>171</b>	<b>167</b>	<b>167</b>	<b>0</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**  
4 **Reptiles**

5 Alternative 1A conservation measures would result in a total loss of 338 acres of potential habitat  
6 for special-status reptiles (Table 12-1A-24). Water conveyance facilities and transmission line  
7 construction, including establishment and use of borrow and spoil areas, (CM1) would cause the loss  
8 of special-status reptile habitat. In addition, habitat enhancement and management activities  
9 (CM11), such as ground disturbance or removal of nonnative vegetation, could result in local  
10 adverse habitat effects for special-status reptiles. For purposes of this analysis, the acres of total  
11 effects are considered the same for both San Joaquin coachwhip and Blainville's horned lizard, even  
12 through there would be a few more acres of temporary effect on the Blainville's horned lizard  
13 resulting from activities in CZ 4.

14 In addition to habitat loss and conversion, construction activities, such as grading, the movement of  
15 construction vehicles or heavy equipment, and the installation of water conveyance facilities  
16 components and new transmission lines, may result in the direct mortality, injury, or harassment of  
17 special-status reptiles, including the potential crushing of individuals and disruption of essential  
18 behaviors. Construction of access roads could fragment suitable habitat, potentially impede upland  
19 movements in some areas, and increase the risk of road mortality. Construction activities related to  
20 conservation components could have similar affects. Each of these individual activities is described  
21 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion  
22 follow the individual conservation measure discussions.

- 23 • *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the  
24 permanent loss of approximately 171 acres of habitat for special-status reptiles in the vicinity of  
25 Clifton Court Forebay. Construction-related effects would temporarily disturb 167 acres of  
26 suitable habitat for special-status reptiles in the study area.

- 1       • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
2 actions included in *CM11* that are designed to enhance wildlife values in BDCP-protected  
3 habitats may result in localized ground disturbances that could temporarily remove small  
4 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of  
5 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
6 minor adverse effects on available special-status reptile habitat and are expected to result in  
7 overall improvements to and maintenance of species habitat values over the term of the BDCP.  
8 These effects cannot be quantified, but are expected to be minimal and would be reduced  
9 through implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*  
10 *Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures*.
- 11       • Operations and maintenance: Ongoing facilities operation and maintenance is expected to have  
12 little if any adverse effect on special-status reptiles. Postconstruction operation and  
13 maintenance of the above-ground water conveyance facilities could result in ongoing but  
14 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study  
15 area. These effects, however, would be minimized with implementation of Mitigation Measure  
16 BIO-55, *Conduct Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement*  
17 *Applicable CM22 Measures*. Injury and direct mortality: Construction vehicle activity may cause  
18 injury to or mortality of special-status reptiles. The operation of equipment for land clearing,  
19 construction, operation and maintenance, and restoration, enhancement, and management  
20 activities could result in injury or mortality. This risk is highest from late fall through early  
21 spring, when special-status reptiles are not as active. Increased vehicular traffic associated with  
22 BDCP actions could contribute to a higher incidence of road kill. However, conducting  
23 construction during the late-spring through early fall periods when feasible and implementation  
24 of Mitigation Measure BIO-55 would avoid and minimize injury or mortality of special-status  
25 reptiles during construction.

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

### 29 ***Near-Term Timeframe***

30 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
31 term BDCP conservation strategy has been evaluated to determine whether it would provide  
32 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
33 construction effects would not be adverse under NEPA.

34 Alternative 1A would remove 338 acres of grassland habitat for special-status reptiles from CM1.  
35 The typical NEPA mitigation ratio (2:1 for protection) for this natural community would indicate  
36 that 676 acres should be protected in the near-term to offset CM1 losses.

37 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
38 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all  
39 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
40 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

41 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55,  
42 to avoid and minimize injury or mortality of special-status reptiles during construction, the

1 permanent and temporary loss of special-status reptile habitat and the potential mortality of either  
2 species from Alternative 1A would not be an adverse effect.

3 **Late Long-Term Timeframe**

4 Alternative 1A as a whole would result in the permanent loss of 338 acres of habitat for special-  
5 status reptiles over the life of the plan.

6 Effects of water conveyance facilities construction would be offset through the plan's long-term  
7 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal  
8 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the study area  
9 (Objective GNC1.1 and GNC1.2). Grassland protection would focus in particular on acquiring the  
10 largest remaining contiguous patches of unprotected grassland habitat, which are located south of  
11 SR 4 in CZ 8 (BDCP Appendix 2.A, *Covered Species Accounts*). This area connects to more than 620  
12 acres of existing habitat that is protected under the East Contra Costa County HCP/NCCP.

13 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*  
14 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable CM22*  
15 *Measures*. The plan as a whole is expected to benefit special-status reptiles that could be present by  
16 protecting potential habitat from loss or degradation that otherwise could occur with future changes  
17 in existing land use. To the extent that grassland habitat is restored in CZ 8, restoration would  
18 remove unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-  
19 value cover, foraging, and dispersal habitat. The overall effect would be beneficial because the  
20 Alternative 1A would result in a net increase in acreage of grassland habitat in the Plan Area.

21 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
22 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
23 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
24 construction.

25 **NEPA Effects:** In the near-term and late long-term, the loss of special-status reptile habitat under  
26 Alternative 1A would be not be adverse because the BDCP has committed to protecting the acreage  
27 required to meet the typical mitigation ratios described above and because of the implementation of  
28 Mitigation Measure BIO-55 and applicable CM22 measures.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP conservation strategy has been evaluated to determine whether it would provide  
33 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 construction effects would be less than significant under CEQA.

35 Alternative 1A would remove 338 acres of grassland habitat for special-status reptiles from CM1.  
36 The typical NEPA mitigation ratio (2:1 for protection) for this natural community would indicate  
37 that 676 acres should be protected in the near-term to offset CM1 losses.

38 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
39 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all  
40 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
41 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

1 The natural community restoration and protection activities are expected to be concluded during  
2 the first 10 years of Plan implementation, which would be close enough to the timing of construction  
3 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy  
4 and the implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*  
5 *Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures*, the permanent and  
6 temporary loss of special-status reptile habitat and the potential mortality of either species would  
7 be less than significant.

#### 8 **Late Long-Term Timeframe**

9 Alternative 1A as a whole would result in the permanent loss of 338 acres of habitat for special-  
10 status reptiles over the life of the plan.

11 Effects of water conveyance facilities construction would be offset through the plan's long-term  
12 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal  
13 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the study area  
14 (Objective GNC1.1 and GNC1.2). Grassland protection would focus in particular on acquiring the  
15 largest remaining contiguous patches of unprotected grassland habitat, which are located south of  
16 SR 4 in CZ 8 ((Objective GNC1.1). This area connects to more than 620 acres of existing habitat that  
17 is protected under the East Contra Costa County HCP/NCCP.

18 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*  
19 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable CM22*  
20 *Measures*. The plan as a whole is expected to benefit special-status reptiles that could be present by  
21 protecting potential habitat from loss or degradation that otherwise could occur with future changes  
22 in existing land use. To the extent that grassland habitat is restored in CZ 8, restoration would  
23 remove unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-  
24 value cover, foraging, and dispersal habitat. The overall effect would be beneficial because the  
25 Alternative 1A would result in a net increase in acreage of grassland habitat in the Plan Area.

26 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
27 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
28 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
29 construction. Considering the BDCP conservation strategy and the implementation of Mitigation  
30 Measure BIO-55, the permanent and temporary loss of special-status reptile habitat and the  
31 potential mortality of either species would be less than significant.

#### 32 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-** 33 **Status Reptiles and Implement Applicable CM22 Measures**

34 DWR will retain a qualified biologist to conduct a habitat assessment in areas that are relatively  
35 undisturbed or have a moderate to high potential to support non-covered special-status reptiles  
36 (Blainville's horned lizard and San Joaquin coachwhip) in CZ 4, CZ 7, and CZ 8. The qualified  
37 biologist will survey for noncovered special-status reptiles in areas of suitable habitat  
38 concurrent with the preconstruction surveys for covered species in CZ 4, CZ 7, and CZ 8. If  
39 special-status reptiles are detected, the biologist will passively relocate the species out of the  
40 work area prior to construction if feasible.

41 In addition, *CM22 Avoidance and Minimization Measures*, specifically *AMM1 Worker Awareness*  
42 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, and *AMM6 Disposal*

1            *and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, will be implemented for all  
2 noncovered special-status reptiles adversely affected by the BDCP to avoid, minimize, or  
3 compensate for impacts.

#### 4            **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

5            Construction activities associated with water conveyance facilities, conservation components and  
6 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
7 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
8 postconstruction disturbances and noise with localized effects on special-status reptiles and their  
9 habitat over the term of the BDCP. In addition, construction activities could indirectly affect special-  
10 status reptiles if construction resulted in the introduction of invasive weeds that create vegetative  
11 cover that is too dense for the species to navigate. Construction vehicles and equipment can  
12 transport in their tires and various parts under the vehicles invasive weed seeds and vegetative  
13 parts from other regions to construction sites, resulting in habitat degradation. These effects would  
14 be reduced through implementation of *AMM10 Restoration of Temporarily Affected Natural*  
15 *Communities*.

16            Water conveyance facilities operations and maintenance activities would include vegetation and  
17 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
18 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
19 activities are not expected to remove special-status reptile habitat, operation of equipment could  
20 disturb small areas of vegetation around maintained structures and could result in injury or  
21 mortality of individual special-status reptiles, if present.

22            **NEPA Effects:** Implementation of the Mitigation Measure BIO-55 and AMM10 would avoid the  
23 potential for substantial adverse effects on these species, either indirectly or through habitat  
24 modifications. The mitigation measures would also avoid and minimize effects that could  
25 substantially reduce the number of special-status reptiles, or restrict either species' range.  
26 Therefore, with implementation of Mitigation Measure BIO-55 and AMM10, the indirect effects of  
27 Alternative 1A on special-status reptiles would not be adverse under NEPA.

28            **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
29 as construction-related noise and visual disturbances could impact special-status reptiles. In  
30 addition, construction activities could indirectly affect special-status reptiles if construction resulted  
31 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to  
32 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and  
33 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but  
34 operation of equipment could disturb small areas of vegetation around maintained structures and  
35 could result in injury or mortality of individual special-status reptiles, if present.

36            With implementation of Mitigation Measure BIO-55 and AMM10 as part of Alternative 1A  
37 construction, operation, and maintenance, the BDCP would avoid the potential for significant effects  
38 on special-status reptile species, either indirectly or through habitat modifications, and would not  
39 result in a substantial reduction in numbers or a restriction in the range of either species. With  
40 implementation of Mitigation Measure BIO-55 and AMM10, the indirect effects of BDCP Alternative  
41 1A would have a less-than-significant impact on special-status reptiles.

1           **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**  
2           **Status Reptiles and Implement Applicable CM22 Measures**

3           See description of Mitigation Measure BIO-55 under Impact BIO-55.

4           **California Black Rail**

5           This section describes the effects of Alternative 1A, including water conveyance facilities  
6           construction and implementation of other conservation components, on the California black rail.  
7           The habitat model used to assess effects on the California black rail is based on primary breeding  
8           habitat and secondary habitat. Primary (breeding) habitat for this species within the Delta consists  
9           of all *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in  
10          patches greater than 0.55 acre (essentially, instream islands of the San Joaquin River and its  
11          tributaries and White Slough Wildlife Area). In Suisun Marsh, primary habitat consists of all  
12          *Schoenoplectus* and *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre,  
13          with the exception that all low marsh habitats dominated by *Schoenoplectus acutus* and *S.*  
14          *californicus* and all managed wetlands, in general, are considered secondary habitat with lesser  
15          ecological value. Upland transitional zones, providing refugia during high tides, within 150 feet of  
16          the tidal wetland edge were also included as secondary habitat. Secondary habitats generally  
17          provide only a few ecological functions such as foraging (low marsh and managed wetlands) or  
18          extreme high tide refuge (upland transition zones), while primary habitats provide multiple  
19          functions, including breeding, effective predator cover, and valuable foraging opportunities.

20          Construction and restoration associated with Alternative 1A conservation measures would result in  
21          both temporary and permanent losses of California black rail modeled habitat, as indicated in Table  
22          12-1A-25. Full implementation of Alternative 1A would also include the following conservation  
23          actions over the term of the BDCP to benefit the California black rail (BDCP Chapter 3, Section 3.3,  
24          *Biological Goals and Objectives*).

- 25          • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at  
26          least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
27          with CM4).
- 28          • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
29          and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 30          • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
31          in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 32          • Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands  
33          and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 34          • Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands  
35          (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 36          • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
37          natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

38          As explained below, with the restoration and protection of these amounts of habitat, in addition to  
39          natural community enhancement and management commitments (including CM12 *Methylmercury*  
40          *Management*), AMM1–AMM7, AMM18 *California Clapper Rail and California Black Rail*, and AMM27  
41          *Selenium Management*, impacts on the California black rail would not be adverse for NEPA purposes  
42          and would be less than significant for CEQA purposes.

1 **Table 12-1A-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 1A**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	3	3	1	1	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Primary	76	84	0	0	0	0
	Secondary	986	3,044	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>1,062</b>	<b>3,128</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>1,065</b>	<b>3,131</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3  
4 **Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

5 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
6 of up to 88 acres of modeled primary habitat, and up to 3,044 acres of modeled secondary habitat  
7 for California black rail (Table 12-1A-25). Conservation measures that would result in these losses  
8 are conveyance facilities and transmission line construction, and establishment and use of borrow  
9 and spoil areas (CM1) and tidal habitat restoration (CM4). Habitat enhancement and management  
10 activities (CM11) activities, which include ground disturbance or removal of nonnative vegetation,  
11 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
12 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
13 degrade or eliminate California black rail habitat. Each of these individual activities is described  
14 below. A summary statement of the combined NEPA effects, and a CEQA conclusion follow the  
15 individual conservation measure discussions.

- 16 • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 1A conveyance  
17 facilities would result in the combined permanent and temporary loss of up to 4 acres of  
18 modeled California black rail habitat, composed of 1 acre of primary, and 3 acres of secondary  
19 habitat (Table 12-1A-25). Of the 4 acres of modeled habitat that would be removed, 1 acre  
20 would be a temporary loss of primary habitat. Activities that would impact modeled habitat  
21 consist of tunnel construction, temporary access roads, and construction of transmission lines in  
22 the central Delta in CZ 5 (between Bouldin and Venice Islands), CZ 6 (east of Bacon Island), and  
23 CZ 8 (at the north end of Coney Island). The construction footprint for CM1 does not overlap  
24 with any California black rail occurrences. The implementation of *AMM19 California Clapper Rail*

1 *and California Black Rail* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) would  
2 minimize the effects of construction on adjacent rails if present in the area. Refer to the  
3 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.

- 4 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage  
5 improvements associated with the Yolo Bypass would result in the permanent removal of  
6 approximately 5 acres of primary California black rail habitat in CZ 2. The loss is expected to  
7 occur during the first 10 years of Alternative 1A implementation.
- 8 • *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be  
9 affected by tidal marsh restoration. Some California black rail modeled habitat would be  
10 permanently lost such that it no longer serves as habitat, while other modeled habitat would  
11 change value through conversion from one habitat type to another. Tidal habitat restoration site  
12 preparation and inundation would result in the permanent loss of 79 acres of primary habitat  
13 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat  
14 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the  
15 species due to increased water elevations.

16 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh  
17 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches  
18 and would be replaced by larger continuous areas of tidal wetlands that are expected to support  
19 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,  
20 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least  
21 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-  
22 term would benefit California black rail. The primary habitat for the species in the Delta consists  
23 of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in  
24 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to  
25 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects  
26 would include an ecotone between wetlands and transitional uplands which would provide  
27 upland refugia for the species.

28 The tidal natural communities restoration would be phased through the course of the BDCP  
29 restoration program to allow for recovery of some areas before the initiation of restoration  
30 actions in other areas. However, California black rails have a greater use of mature tidal marshes  
31 and, therefore, it would be years before the newly restored marshes provided suitable habitat  
32 for the species. In the long-term, tidal natural communities restoration is expected to have little  
33 to no adverse effects on California black rail habitat because the habitat removed would be  
34 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a  
35 benefit for California black rail.

- 36 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
37 actions contained in *CM11 Natural Communities Enhancement and Management* that are  
38 designed to enhance wildlife values in restored and protected tidal wetland habitats may result  
39 in localized ground disturbances that could temporarily remove small amounts of California  
40 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
41 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
42 on available California black rail habitat and are expected to result in overall improvements and  
43 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual  
44 disturbances during implementation of habitat management actions could also result in  
45 temporary disturbances that affect California black rail use of the surrounding habitat. These



1 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below.  
2 Additional actions under CM11 include the control of nonnative predators to reduce nest  
3 predation as needed.

- 4 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
5 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
6 disturbances that could affect California black rail use of the surrounding habitat in Suisun and  
7 the central Delta. Maintenance activities would include vegetation management, levee and  
8 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
9 would be reduced by AMMs and conservation actions as described below.
- 10 • Injury and Direct Mortality: Construction vehicle activity may cause injury or mortality to  
11 California black rail. If rails are present adjacent to covered activities, the operation of  
12 equipment for land clearing, construction, conveyance facilities operation and maintenance, and  
13 habitat restoration, enhancement, and management could result in injury or mortality of  
14 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to  
15 a higher incidence of road kill. However, conducting construction outside of the breeding season  
16 where feasible (reducing the risk of impacting active nests), construction monitoring, and other  
17 measures would be implemented to avoid and minimize injury or mortality of the species during  
18 construction, as required by AMM1–AMM7 and *AMM19 California Clapper Rail and California*  
19 *Black Rail* listed below.

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

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

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would not be adverse under NEPA. With Alternative 1A implementation,  
28 there would be a loss of 1,066 acres of modeled habitat for California black rail in the study area in  
29 the near-term. These effects would result from the construction of the water conveyance facilities  
30 (CM1, 4 acres of primary habitat), and implementing other conservation measures (CM2 Yolo  
31 Bypass Fisheries Enhancement and CM4 Tidal Natural Communities Restoration–76 acres of  
32 primary habitat, 986 acres of secondary habitat).

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
34 be affected and that are identified in the biological goals and objectives for California black rail in  
35 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
36 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
37 Using this ratio would indicate that 4 acres of tidal natural communities should be restored/created  
38 to compensate for the CM1 losses of California black rail habitat. The near-term effects of other  
39 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring  
40 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio  
41 (1:1 for restoration).

42 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
43 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in

1 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and  
 2 would occur in the same timeframe as the construction and early restoration losses, thereby  
 3 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland  
 4 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun  
 5 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective  
 6 TBEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and the tidal freshwater emergent wetland  
 7 would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition,  
 8 tidal brackish and tidal freshwater emergent wetlands would be restored in a way that creates  
 9 topographic heterogeneity and in areas that increase connectivity among protected lands  
 10 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland  
 11 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of  
 12 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists  
 13 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-  
 14 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent  
 15 performance standards for considering the effectiveness of CM4 restoration actions. The acres of  
 16 restoration and protection contained in the near-term Plan goals and the additional detail in the  
 17 biological objectives for California black rail satisfy the typical mitigation that would be applied to  
 18 the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation  
 19 measures.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
 21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
 22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
 23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
 24 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
 25 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
 26 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
 27 3.C, *Avoidance and Minimization Measures*.

28 **Late Long-Term Timeframe**

29 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
 30 habitat for California black rail. Alternative 1A as a whole would result in the permanent loss of and  
 31 temporary effects on 88 acres of primary habitat and 3,044 acres of secondary habitat for California  
 32 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of  
 33 the total secondary habitat in the study area). The locations of these losses are described above in  
 34 the analyses of individual conservation measures. The Plan includes conservation commitments  
 35 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal  
 36 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal  
 37 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These tidal  
 38 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches,  
 39 and at least 1,500 acres of restored marsh would consist of middle-and high-marsh vegetation with  
 40 dense, tall stands of pickleweed and bulrush cover serving as primary habitat for California black  
 41 rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for  
 42 California black rail would be created between the restored tidal freshwater emergent wetlands and  
 43 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and  
 44 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of  
 45 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through  
 46 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant

1 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
2 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional  
3 pressures on the species such as loss of habitat from invasive species and mortality from nest  
4 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes  
5 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more  
6 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11  
7 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
8 necessary through *CM11 Natural Communities Enhancement and Management*.

9 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
10 and protection actions discussed above would result in the restoration of 3,579 acres of primary  
11 habitat and 12,115 acres of secondary habitat for California black rail and the protection of 275  
12 acres of secondary habitat for the species.

13 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-  
14 status species under Alternative 1A would represent an adverse effect in the absence of other  
15 conservation actions. However, with habitat protection and restoration associated with CM4, guided  
16 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2*  
17 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
18 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail,*  
21 which would be in place throughout the construction period, the effects of Alternative 1A as a whole  
22 on California black rail would not be adverse under NEPA.

### 23 **CEQA Conclusion:**

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

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
28 effects of construction would be less than significant under CEQA. With Alternative 1A  
29 implementation, there would be a loss of 1,066 acres of modeled habitat for California black rail in  
30 the study area in the near-term. These effects would result from the construction of the water  
31 conveyance facilities (CM1, 4 acres of primary habitat), and implementing other conservation  
32 measures (CM2 Yolo Bypass Fisheries Enhancement and CM4 Tidal Natural Communities  
33 Restoration—76 acres of primary habitat, 986 acres of secondary habitat).

34 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
35 be affected and that are identified in the biological goals and objectives for California black rail in  
36 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
37 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
38 Using this ratio would indicate that 4 acres of tidal natural communities should be restored/created  
39 to mitigate the CM1 losses of California black rail habitat. The near-term effects of other  
40 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring  
41 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio  
42 (1:1 for restoration).

1 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
2 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in  
3 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and  
4 would occur in the same timeframe as the construction and early restoration losses, thereby  
5 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland  
6 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun  
7 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective  
8 TBEWNC1.1) and the tidal freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5,  
9 CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent  
10 wetlands would be restored in a way that creates topographic heterogeneity and in areas that  
11 increase connectivity among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of  
12 the 4,800 acres of managed wetland protected and enhanced in CZ 11 would benefit the California  
13 black rail through the enhancement of degraded areas (such as areas of bare ground or marsh where  
14 the predominant vegetation consists of invasive species such as perennial pepperweed) to  
15 vegetation such as pickleweed-alkali heath-American bulrush plant associations (Objective  
16 MWNC1.1). These Plan objectives represent performance standards for considering the  
17 effectiveness of CM4 restoration actions.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
23 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
24 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
25 3.C, *Avoidance and Minimization Measures*.

26 The natural community restoration and protection activities would be concluded in the first 10  
27 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
28 constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
29 *California Black Rail* and *AMM1–AMM7* would avoid and minimize potential impacts on the species  
30 from construction-related habitat loss and noise and disturbance. The 10,850 acres of tidal brackish  
31 and tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland  
32 protection and enhancement contained in the near-term Plan goals, and the additional detail in the  
33 biological objectives for California black rail, are more than sufficient to support the conclusion that  
34 the near-term impacts of habitat loss and direct mortality under Alternative 1A would be less than  
35 significant under CEQA.

### 36 ***Late Long-Term Timeframe***

37 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
38 habitat for California black rail. Alternative 1A as a whole would result in the permanent loss of and  
39 temporary effects on 88 acres of primary habitat and 3,044 acres of secondary habitat for California  
40 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of  
41 the total secondary habitat in the study area). The locations of these losses are described above in  
42 the analyses of individual conservation measures. The Plan includes conservation commitments  
43 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal  
44 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal  
45 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal wetlands would

1 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the  
2 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of  
3 pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun Marsh  
4 (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California black rail  
5 would be created between the restored tidal freshwater emergent wetlands and transitional  
6 uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and CBR1.1).  
7 Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of *CM3*  
8 *Natural Communities Protection and Restoration* would benefit the California black rail through the  
9 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
10 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
11 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional  
12 pressures on the species such as loss of habitat from invasive species and mortality from nest  
13 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes  
14 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more  
15 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11  
16 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
17 necessary through *CM11 Natural Communities Enhancement and Management*.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
23 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
24 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
25 3.C, *Avoidance and Minimization Measures*.

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
27 and protection actions discussed above would result in the restoration of 3,579 acres of primary  
28 habitat and 12,115 acres of secondary habitat for California black rail and the protection of 275  
29 acres of secondary habitat for the species.

30 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
31 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to  
32 construction and restoration activities, loss of habitat or direct mortality through implementation of  
33 Alternative 1A would not result in a substantial adverse effect through habitat modifications and  
34 would not substantially reduce the number or restrict the range of the species. Therefore, the  
35 alternative would have a less-than-significant impact on California black rail.

### 36 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 37 **Facilities**

38 New transmission lines would increase the risk for bird-power line strikes, which could result in  
39 injury or mortality of California black rail. Black rails are known to suffer mortality from  
40 transmission line collision, likely associated with migration and flights between foraging areas  
41 (Eddleman et al 1994). Due to their wing shape and body size, rails have low to moderate flight  
42 maneuverability (Bevanger 1998), increasing susceptibility to collision mortality. However, there  
43 are relatively few records of California black rail collisions with overhead wires. California black  
44 rails exhibit daytime site fidelity and a lack of long-distance night migration, two factors which are

1 associated with low collision risk in avian species (Eddleman et al. 1994). California black rail  
2 movements in the Plan Area are likely short, seasonal, and at low altitudes, typically less than 16 feet  
3 (5 meters) (Eddleman et al 1994). While the species may have low to moderate flight  
4 maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting and foraging,  
5 solitary, no flocking, secretive) reduces potential exposure to overheard wires and vulnerability to  
6 collision mortality (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
7 *Proposed BDCP Powerlines*). Transmission line poles and towers also provide perching substrate for  
8 raptors, which could result in increased predation pressure on local black rails. Little is currently  
9 known about the seasonal movements of black rails or the potential for increased predation on rails  
10 near power poles. However, transmission facilities are expected to have few adverse effects on the  
11 black rail population.

12 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
13 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight  
14 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike  
15 diverters on all new powerlines and select existing powerlines, which would further minimize risk  
16 of bird strike for California black rails in the Delta. Transmission line structures could increase  
17 predation on local black rails by providing perching structures for raptors. However, these impacts  
18 on the California black rail population are not expected to be adverse.

19 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
20 significant impact on California black rail because the risk of bird strike is considered to be minimal  
21 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the  
22 commitment to place bird strike diverters on all new powerlines and select existing powerlines,  
23 which would further minimize risk of bird strike for California black rails in the Delta. Transmission  
24 line structures could increase predation on local black rails by providing perching structures for  
25 raptors. However, these impacts on the California black rail population are expected to be less than  
26 significant.

## 27 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

28 **Indirect construction-related effects:** Both primary and secondary habitat for California black rail  
29 within the vicinity of proposed construction areas could be indirectly affected by construction  
30 activities. Indirect effects associated with construction include noise, dust, and visual disturbance  
31 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
32 footprint but within 500 feet from the construction edge. Construction noise above background  
33 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
34 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
35 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
36 the extent to which these noise levels could affect California black rail. The use of mechanical  
37 equipment during water conveyance facilities construction could cause the accidental release of  
38 petroleum or other contaminants that could affect California black rail in the surrounding habitat.  
39 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat  
40 could also affect the species.

41 If construction occurs during the nesting season, these indirect effects could result in the loss or  
42 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment  
43 in AMM19 (as described in BCDP Appendix 3.C, *Avoidance and Minimization Measures*) that  
44 preconstruction surveys of potential breeding habitat would be conducted within 700 feet of project

1 activities, and a 500-foot no-disturbance buffer would be established around any territorial call-  
2 centers during the breeding season. In addition, construction would be avoided altogether if  
3 breeding territories cannot be accurately delimited.

4 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
5 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
6 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
7 would generally increase as a result of water operations and operations of salinity-control gates to  
8 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
9 plant communities tolerant of more brackish environments, which should be beneficial to California  
10 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

11 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
12 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
13 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
14 tidal marshes and flood plains. Thus, BDCP restoration activities that create newly inundated areas  
15 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
16 restoration). Increased methylmercury associated with natural community and floodplain  
17 restoration may indirectly affect California black rail, via uptake in lower trophic levels (as described  
18 in the BDCP, Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated  
19 with high tidal marshes that experience intermittent wetting and drying and associated anoxic  
20 conditions (Alpers et al. 2008). The potential mobilization or creation of methylmercury within the  
21 study area varies with site-specific conditions and would need to be assessed at the project level.  
22 *CM12 Methylmercury Management* contains provisions for project-specific Mercury Management  
23 Plans. Along with avoidance and minimization measures and adaptive management and monitoring,  
24 CM12 is expected to reduce the effects of methylmercury resulting from BDCP natural communities  
25 and floodplain restoration on California black rail.

26 Concentrations of methylmercury known to cause reproductive effects in birds have been found in  
27 blood and feather samples of San Francisco Bay black rails (Tsao et al. 2009). Because they forage  
28 directly in contaminated sediments, California black rails may be especially prone to methylmercury  
29 contamination. Currently, it is unknown how much of the sediment-derived methylmercury enters  
30 the food chain in Suisun Marsh or what tissue concentrations are actually harmful to the California  
31 black rail. Although tidal habitat restoration might increase methylation of mercury export to other  
32 habitats, it is unlikely to increase the exposure of methylmercury to California black rail, as they  
33 currently reside in tidal marshes in the Delta and the San Francisco Bay, where elevated  
34 methylmercury levels exist. Sites-specific restoration plans that address the creation and  
35 mobilization of mercury, as well as monitoring and adaptive management as described in CM12  
36 would address the uncertainty of methylmercury levels in restored tidal marsh.

37 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
38 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
39 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
40 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
41 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
42 classes within a species. In addition, the effect of selenium on a species can be confounded by  
43 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
44 2009).

1 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
2 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
3 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
4 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
5 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
6 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
7 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
8 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
9 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
10 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
11 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
12 levels of selenium have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
15 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal  
16 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
17 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
18 restoration activities that create newly inundated areas could increase bioavailability of selenium  
19 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
20 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
21 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
22 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
23 difficult to determine whether the effects of potential increases in selenium bioavailability  
24 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse  
25 effects on California black rail.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a  
27 substantial effect on California black rail from increases in selenium associated with restoration  
28 activities. This effect would be addressed through the implementation of *AMM27, Selenium*  
29 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
30 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
31 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
32 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
33 separately for each restoration effort as part of design and implementation. This avoidance and  
34 minimization measure would be implemented as part of the tidal habitat restoration design  
35 schedule.

36 **NEPA Effects:** Potential adverse effects of noise and visual disturbances on California black rail  
37 would be minimized with *AMM19 California Clapper Rail and California Black Rail*. *AMM1–AMM7*,  
38 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
39 likelihood of spills from occurring and ensure that measures were in place to prevent runoff from  
40 the construction area and to avoid negative effects of dust on the species. Implementation of  
41 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
42 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
43 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
44 California black rail to selenium. This effect would be addressed through the implementation of  
45 *AMM27 Selenium Management* which would provide specific tidal habitat restoration design  
46 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal



1 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
2 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 1A  
3 implementation would not have an adverse effect on California black rail. Tidal habitat restoration is  
4 unlikely to have a significant impact on California black rail through increased exposure to  
5 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
6 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
7 the potential for increased exposure varies substantially within the study area. Site-specific  
8 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
9 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
10 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
11 assess the potential for risk of methylmercury exposure for California black rail, once site specific  
12 sampling and other information could be developed.

13 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other  
14 conservation measures could disturb primary and secondary California black rail habitat adjacent to  
15 work sites. *AMM19 California Clapper Rail and California Black Rail* would avoid and minimize  
16 impacts on California black rail from noise and visual disturbance. The use of mechanical equipment  
17 during water conveyance facilities construction could cause the accidental release of petroleum or  
18 other contaminants that could affect California black rail in the surrounding habitat. The inadvertent  
19 discharge of sediment or excessive dust adjacent to California black rail habitat could also affect the  
20 species. These impacts on California black rail would be less than significant with the incorporation  
21 of *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, into the  
22 BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates, and  
23 tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
24 gradient changes should have a beneficial impact on California black rail through the establishment  
25 of tidal marsh similar to historic conditions. Tidal habitat restoration is unlikely to have a significant  
26 impact on California black rail through increased exposure to methylmercury, as rails currently  
27 reside in tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
28 concentrations of methylmercury are harmful to the species. Site-specific restoration plans in  
29 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
30 would address the uncertainty of methylmercury levels in restored tidal marsh. Tidal habitat  
31 restoration could result in increased exposure of California black rail to selenium. This effect would  
32 be addressed through the implementation of *AMM27 Selenium Management*, which would provide  
33 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
34 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of plan  
35 implementation would have a less-than-significant impact on California black rail.

### 36 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation** 37 **Component Implementation**

38 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
39 temporary barriers to California black rail movements. Grading, filling, contouring and other initial  
40 ground-disturbing activities could remove habitat along movement corridors used by individuals  
41 and could temporarily reduce access to adjacent habitat areas. The temporary adverse effects of  
42 fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration  
43 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*  
44 *Natural Community Restoration* activities. The tidal natural communities restoration would be  
45 phased through the course of the BDCP restoration program to allow for recovery of some areas

1 before restoration actions are initiated in other areas. In addition, *AMM19 California Clapper Rail*  
2 *and California Black Rail* would avoid and minimize effects on California black rail.

3 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
4 movement would not represent an adverse effect on California black rail as a result of habitat  
5 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would  
6 be phased to allow for the recovery of some areas before restoration actions are initiated in other  
7 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
8 minimize effects on California black rail.

9 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
10 movement would represent a less-than-significant impact on California black rail as a result of  
11 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*  
12 would be phased to allow for the recovery of some areas before restoration actions are initiated in  
13 other areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
14 minimize impacts on California black rail.

### 15 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of** 16 **Implementation of Conservation Components**

17 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the  
18 periodic inundation of modeled habitat for California black rail. There are no records for California  
19 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the  
20 area has been surveyed for California black rails is unknown. Therefore, there is potential for the  
21 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration  
22 activities are completed. However, periodic inundation would not result in permanent habitat loss  
23 and would not prevent use of the bypass by current or future rail populations.

24 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
25 construction of setback levees could result in increased magnitude, frequency and duration of  
26 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of  
27 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting  
28 California black rail are considered to be low, and would not be expected to result in adverse effects  
29 on the species.

30 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
31 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California  
32 black rail as a result of habitat modification of a special-status species because periodic inundation  
33 would not result in permanent habitat loss and would not prevent use of the bypass by current or  
34 future rail populations. The risk of changes in inundation frequency and duration through CM2 and  
35 CM5 affecting California black rail is considered to be low.

36 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
37 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on  
38 California black rail because periodic inundation would not result in permanent habitat loss and  
39 would not prevent use of the bypass by current or future rail populations. The risk of changes in  
40 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is  
41 considered to be low.

1       **California Clapper Rail**

2       This section describes the effects of Alternative 1A, including water conveyance facilities  
3       construction and implementation of other conservation components, on California clapper rail.  
4       California clapper rail habitat includes mostly middle marsh habitat with select emergent wetland  
5       plant alliances. Secondary habitats generally provide only a few ecological functions such as foraging  
6       (low marsh) or high-tide refuge (upland transition zones), while primary habitats provide multiple  
7       functions including breeding, effective predator cover, and forage. Further details regarding the  
8       habitat model, including assumptions on which the model is based, are provided in Appendix 2.A,  
9       *Covered Species Accounts*.

10       Construction and restoration associated with Alternative 1A conservation measures would result in  
11       both temporary and permanent losses of California clapper rail modeled habitat as indicated in  
12       Table 12-1A-26. Full implementation of Alternative 1A would also include the following  
13       conservation actions over the term of the BDCP to benefit the California clapper rail (BDCP Chapter  
14       3, Section 3.3, *Biological Goals and Objectives*).

- 15       • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
16       least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
17       with CM4).

18       As explained below, with the restoration and protection of these amounts of habitat, in addition to  
19       natural community enhancement and management commitments (including *CM12 Methylmercury*  
20       *Management*) and implementation of AMM1–AMM7, *AMM18 California Clapper Rail and California*  
21       *Black Rail*, and *AMM27 Selenium Management*, impacts on the California clapper rail would not be  
22       adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-26. Changes in California Clapper Rail Modeled Habitat Associated with Alternative**  
2 **1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Primary	26	27	0	0	NA	NA
	Secondary	50	50	0	0	NA	NA
<b>Total Impacts CM2-CM18</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**  
4 **Rail**

5 Alternative 1A conservation measures would result in the total loss or conversion of up to 35 acres  
6 of modeled California clapper rail habitat consisting of 27 acres of primary habitat and 8 acres of  
7 secondary habitat (Table 12-1A-26). The conservation measure that would result in these losses is  
8 tidal natural communities restoration (CM4). The conservation measure that would result in these  
9 losses is tidal natural communities restoration (CM4). Habitat enhancement and management  
10 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also  
11 result in local adverse habitat effects. Each of these individual activities is described below. A  
12 summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the  
13 individual conservation measure discussions.

- 14 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert  
15 approximately 35 acres of modeled California clapper rail habitat, primarily in CZ 11. The tidal  
16 marsh restoration action would not result in the permanent loss of any California clapper rail  
17 habitat in the Plan Area. However, approximately 27 acres of primary habitat would be  
18 converted to secondary low marsh habitat and 8 acres of secondary habitat would be converted  
19 to middle or high marsh. Full implementation of CM4 would restore or create at least  
20 6,000 acres of tidal brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a  
21 mosaic of large, interconnected, and biologically diverse patches that supported a natural  
22 gradient extending from subtidal to the upland fringe. Much of the restored tidal brackish  
23 emergent wetland would meet the primary habitat requirements of the California clapper rail,  
24 including development of mid- and high-marsh vegetation with dense, tall stands of pickleweed

1 cover. Restoration would be sequenced and spaced in a manner that minimizes any temporary,  
2 initial loss of habitat and habitat fragmentation.

- 3 • *CM11 Natural Communities Enhancement and Management*: Because the entire California  
4 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement  
5 and restoration actions would be expected to benefit the species by creating the potential for  
6 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail  
7 habitat would be monitored to determine if there is a need for predator control actions. If  
8 implemented, nonnative predators would be controlled as needed to reduce nest predation and  
9 to help maintain species abundance. A variety of habitat management actions included in *CM11*  
10 *Natural Communities Enhancement and Management* that are designed to enhance wildlife  
11 values in restored and protected tidal wetland habitats could result in localized ground  
12 disturbances that could temporarily remove small amounts of California clapper rail habitat.  
13 Ground-disturbing activities, such as removal of nonnative vegetation and road and other  
14 infrastructure maintenance activities, would be expected to have minor adverse effects on  
15 available California clapper rail habitat. These potential effects are currently not quantifiable,  
16 but would be minimized with implementation *AMM19 Clapper Rail and California Black Rail*  
17 (BDCP Appendix 3.C, *Avoidance and Minimization Measures*).
- 18 • **Operations and Maintenance**: Postconstruction operation and maintenance of the restoration  
19 infrastructure could result in ongoing but periodic disturbances that could affect California  
20 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include  
21 vegetation management, and levee repair. These effects, however, would be reduced by AMMs  
22 and conservation actions as described below.
- 23 • **Injury and Direct Mortality**: Construction vehicle activity may cause injury or mortality to  
24 California black rail. If rails are present adjacent to covered activities, the operation of  
25 equipment for land clearing, and habitat restoration, enhancement, and management could  
26 result in injury or mortality of California clapper rail. Operation of construction equipment could  
27 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and  
28 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the  
29 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals  
30 are expected to avoid contact with construction equipment. However, nest sites would be  
31 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*  
32 *Rail and California Black Rail* listed below.

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

### 36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
40 effects of construction would not be adverse under NEPA. There would be no impacts resulting from  
41 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76  
42 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects  
43 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary  
44 and 50 acres of secondary habitat).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
2 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
3 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
4 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
5 restored/created to compensate for the CM4 losses of California clapper rail habitat.

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
7 wetland in the Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with  
8 CM4 and would occur in the same timeframe as the early restoration losses, thereby avoiding  
9 adverse effects on California clapper rail. The tidal brackish emergent wetland would be restored in  
10 CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough  
11 Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1) and  
12 would be restored in a way that creates topographic heterogeneity and in areas that increase  
13 connectivity among protected lands (Objectives TBEWNC1.4). These biological goals and objectives  
14 would inform the near-term restoration efforts and represent performance standards for  
15 considering the effectiveness of restoration actions. These Plan objectives represent performance  
16 standards for considering the effectiveness of CM4 restoration actions. The acres of restoration  
17 contained in the near-term Plan goals satisfy the typical mitigation that would be applied to the  
18 near-term effects of tidal restoration.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
24 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
25 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
26 3.C, *Avoidance and Minimization Measures*.

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

28 The habitat model indicates that the study area supports approximately 296 acres of primary and  
29 6,420 acres of secondary habitat for California clapper rail. Alternative 1A as a whole would result in  
30 the permanent loss of and temporary effects on 27 acres of primary habitat and 50 acres of  
31 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary  
32 habitat in the study area and less than 1% of the total secondary habitat in the study area). The  
33 locations of these losses are described above in the analyses of individual conservation measures.  
34 The Plan includes a commitments through *CM4 Tidal Natural Communities Restoration* to restore or  
35 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun  
36 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,  
37 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh  
38 would consist of middle-and high-marsh vegetation, serving as primary habitat for California  
39 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the  
40 species such as loss of habitat from invasive species and mortality from nest predators would also  
41 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail  
42 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish  
43 emergent wetland natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators  
44 would be controlled to reduce nest predation if necessary through *CM11 Natural Communities*  
45 *Enhancement and Management*.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
2 and protection actions discussed above, would result in the restoration of 1,500 acres of primary  
3 habitat and 4,500 acres of secondary habitat for California clapper rail.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
9 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
10 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
11 3.C, *Avoidance and Minimization Measures*.

12 **NEPA Effects:** In the absence of other conservation actions, the loss of California clapper rail habitat  
13 associated with Alternative 1A would represent an adverse effect as a result of habitat modification  
14 of a special-status species and potential for direct mortality. However, with habitat protection and  
15 restoration associated with CM4, guided by biological goals and objectives and *AMM1 Worker*  
16 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*  
17 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*  
18 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable*  
19 *Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper*  
20 *Rail and California Black Rail*, which would be in place throughout the construction period, the  
21 effects of Alternative 1A as a whole on California clapper rail would not be adverse under NEPA.

## 22 **CEQA Conclusion:**

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

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would be less than significant under CEQA. There would be no impacts  
28 resulting from the construction of the water conveyance facilities (CM1). However, there would be a  
29 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from  
30 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres  
31 of secondary habitat).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
33 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
34 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
35 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
36 restored/created to mitigate the CM4 losses of California clapper rail habitat.

37 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
38 wetland in the study area. These conservation actions are associated with CM4 and would occur in  
39 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California  
40 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western  
41 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse  
42 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that

1 creates topographic heterogeneity and in areas that increase connectivity among protected lands  
2 (Objectives TBEWNC1.4).

3 These biological goals and objectives would inform the near-term restoration efforts and represent  
4 performance standards for considering the effectiveness of restoration actions. These Plan  
5 objectives represent performance standards for considering the effectiveness of CM4 restoration  
6 actions.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
12 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
13 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
14 3.C, *Avoidance and Minimization Measures*.

15 The natural community restoration and protection activities would be concluded in the first 10  
16 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts  
17 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
18 *California Black Rail* and *AMM1–AMM7* would avoid and minimize potential impacts on the species  
19 from construction-related habitat loss and noise and disturbance. Because the number of acres  
20 required to meet the typical mitigation ratio described above would be only 76 acres of restored  
21 tidal natural communities, the 2,000 acres of tidal brackish emergent wetland restoration contained  
22 in the near-term Plan goals, and the additional detail in the biological objectives for California  
23 clapper rail, are more than sufficient to support the conclusion that the near-term impacts of habitat  
24 loss and direct mortality under Alternative 1A would be less than significant under CEQA.

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

26 The habitat model indicates that the study area supports approximately 296 acres of primary and  
27 6,420 acres of secondary habitat for California clapper rail. Alternative 1A as a whole would result in  
28 the permanent loss of and temporary effects on 27 acres of primary habitat and 8 acres of secondary  
29 habitat for California clapper rail during the term of the Plan (9% of the total primary habitat in the  
30 study area and less than 1% of the total secondary habitat in the study area). The locations of these  
31 losses are described above in the analyses of individual conservation measures. The Plan includes a  
32 commitment to restore or create at least 6,000 acres of tidal brackish emergent wetlands for  
33 California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would  
34 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the  
35 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of  
36 pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective TBEWNC1.1).  
37 Additional pressures on the species such as loss of habitat from invasive species and mortality from  
38 nest predators would also be addressed through the BDCP. Perennial pepperweed, which  
39 outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more than  
40 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (TBEWNC2.1).  
41 In addition, nonnative predators would be controlled to reduce nest predation if necessary through  
42 *CM11 Natural Communities Enhancement and Management*.



1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
2 and protection actions discussed above, would result in the restoration of 1,500 acres of primary  
3 habitat and 4,500 acres of secondary habitat for California clapper rail.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
9 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
10 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
11 3.C, *Avoidance and Minimization Measures*.

12 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
13 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to  
14 construction and restoration activities, loss of habitat and direct mortality through implementation  
15 of Alternative 1A would not result in a substantial adverse effect through habitat modifications and  
16 would not substantially reduce the number or restrict the range of the species. Therefore, the  
17 alternative would have a less-than-significant impact on California clapper rail.

### 18 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

19 **Indirect construction-related effects:** California clapper rail habitat within the vicinity of  
20 proposed restoration areas could be indirectly affected by construction activities. Indirect effects  
21 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
22 contouring, and other ground-disturbing operations outside the project footprint but within 500  
23 feet from the construction edge. Construction noise above background noise levels (greater than 50  
24 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
25 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
26 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
27 levels could affect California clapper rail. The use of mechanical equipment during construction-  
28 related restoration activities could cause the accidental release of petroleum or other contaminants  
29 that could affect clapper rail in the surrounding habitat. The inadvertent discharge of sediment or  
30 excessive dust adjacent to California clapper rail habitat could also affect the species. If construction  
31 occurs during the nesting season, these indirect effects could result in the loss or abandonment of  
32 nests, and mortality of any eggs and/or nestlings. However, there is a commitment in *AMM19*  
33 *California Clapper Rail and California Black Rail* (as described in BDCP Appendix 3.C, *Avoidance and*  
34 *Minimization Measures*) that preconstruction surveys of potential breeding habitat would be  
35 conducted within 500 feet of project activities, and a 500-foot no-disturbance buffer would be  
36 established around any territorial call-centers during the breeding season. In addition, construction  
37 would be avoided altogether if breeding territories cannot be accurately delimited.

38 Preconstruction surveys conducted under *AMM19 California Clapper Rail and California Black Rail*  
39 would ensure construction-related noise and visual disturbances would not have an adverse effect  
40 on California clapper rail. AMM1–AMM7, including *AMM2 Construction Best Management Practices*  
41 *and Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures  
42 were in place to prevent runoff from the construction area and to avoid negative effects of dust on  
43 the species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*  
44 *and California Black Rail*, there would be no adverse effect on California black rail.

1 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
2 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
3 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
4 would generally increase as a result of water operations and operations of salinity-control gates to  
5 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
6 plant communities tolerant of more brackish environments, which would be beneficial to California  
7 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

8 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration also have the  
9 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
10 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
11 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
12 inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
13 *Strategy*, for details of restoration). Concentrations of methylmercury known to be toxic to bird  
14 embryos have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and  
15 Adelsbach 2003). In general, the highest methylation rates are associated with high tidal marshes  
16 that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al.  
17 2008). Currently, it is unknown how much of the sediment-derived methylmercury enters the food  
18 chain in Suisun Marsh or what tissue concentrations are actually harmful to the California clapper  
19 rail. However, although tidal habitat restoration might increase methylation of mercury export to  
20 other habitats, it is unlikely to significantly increase the exposure of California clapper rails to  
21 methylmercury, as they currently reside in tidal marshes where elevated methylmercury levels  
22 exist. *CM12 Methylmercury Management* includes project-specific management plans including  
23 monitoring and adaptive management to address the uncertainty of methylmercury levels in  
24 restored tidal marsh.

25 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
26 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
27 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
28 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
29 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
30 classes within a species. In addition, the effect of selenium on a species can be confounded by  
31 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
32 2009).

33 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
34 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
35 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
36 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
37 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
38 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
39 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
40 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
41 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
42 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
43 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
44 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
3 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh  
4 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
5 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
6 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
7 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
8 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
9 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
10 long-term increases in selenium concentrations in water in the Delta under any alternative.  
11 However, it is difficult to determine whether the effects of potential increases in selenium  
12 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
13 lead to adverse effects on California clapper rail.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a  
15 substantial effect on California clapper rail from increases in selenium associated with restoration  
16 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
17 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
18 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
19 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
20 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
21 separately for each restoration effort as part of design and implementation. This avoidance and  
22 minimization measure would be implemented as part of the tidal habitat restoration design  
23 schedule.

24 **NEPA Effects:** Potential effects of noise and visual disturbances on California clapper rail would be  
25 minimized with *AMM19 California Clapper Rail and California Black Rail*. *AMM1–AMM7*, including  
26 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
27 spills from occurring and ensure that measures were in place to prevent runoff from the  
28 construction area and to avoid negative effects of dust on the species. Implementation of  
29 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
30 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
31 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
32 California clapper rail to selenium. This effect would be addressed through the implementation of  
33 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
34 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
35 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
36 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 1A  
37 implementation would not have an adverse effect on California clapper rail. Tidal habitat restoration  
38 is unlikely to have an adverse effect on California clapper rail through increased exposure to  
39 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
40 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
41 the potential for increased exposure varies substantially within the study area. Site-specific  
42 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
43 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
44 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
45 assess the potential for risk of methylmercury exposure for California clapper rail, once site specific  
46 sampling and other information could be developed.

1 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the  
2 CMs could disturb approximately 542 acres of California clapper rail habitat adjacent to work sites.  
3 *AMM19 California Clapper Rail and California Black Rail* would avoid and minimize impacts on  
4 California clapper rail from noise and visual disturbance. The use of mechanical equipment during  
5 water conveyance facilities construction could cause the accidental release of petroleum or other  
6 contaminants that could affect California clapper rail in the surrounding habitat. The inadvertent  
7 discharge of sediment or excessive dust adjacent to California clapper rail habitat could also affect  
8 the species. These impacts on California clapper rail would be less than significant with the  
9 incorporation of AMM1–AMM7 into the BDCP. Implementation of Operational Scenario A, including  
10 operation of salinity-control gates, and tidal habitat restoration are expected to increase water  
11 salinity in Suisun Marsh. These salinity gradient changes should have a beneficial impact on  
12 California clapper rail through the establishment of tidal marsh similar to historic conditions.  
13 Although tidal habitat restoration might increase methylation of mercury export to other habitats, it  
14 is unlikely to significantly increase the exposure of California clapper rails to methylmercury, as they  
15 currently reside in tidal marshes in the San Francisco Bay, where elevated methylmercury levels  
16 exist. It is unknown what concentrations of methylmercury are harmful to the species. *CM12*  
17 *Methylmercury Management* includes project-specific management plans including monitoring and  
18 adaptive management to address the uncertainty of methylmercury levels in restored tidal marsh.  
19 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.  
20 This effect would be addressed through the implementation of *AMM27 Selenium Management* which  
21 would provide specific tidal habitat restoration design elements to reduce the potential for  
22 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
23 Alternative 1A implementation would have a less-than-significant impact on California clapper rail.

24 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission**  
25 **Facilities**

26 Isolated patches of suitable California clapper rail habitat may occur in the Plan Area as far east as  
27 (but not including) Sherman Island. Home range and territory of the California clapper rail is not  
28 known, but in locations outside of California, clapper rail territory ranges from 0.3 acre to 8 acres  
29 (0.1 to 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect  
30 with the proposed lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*  
31 *BDCP Transmission Lines*). The location of the current population and suitable habitat for the species  
32 make collision with the proposed transmission lines highly unlikely.

33 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
34 effect on California clapper rail because the location of the current population and suitable habitat  
35 for the species would make collision with the proposed transmission lines highly unlikely.

36 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
37 significant impact on California clapper rail because the location of the current population and  
38 suitable habitat for the species would make collision with the proposed transmission lines highly  
39 unlikely.

40 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation**  
41 **Component Implementation**

42 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
43 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other

1 initial ground-disturbing activities could remove habitat along movement corridors used by  
2 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse  
3 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or  
4 restoration activities resulting in barriers to movement would be minimized through sequencing of  
5 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities  
6 restoration would be phased through the course of the BDCP restoration program to allow for  
7 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*  
8 *California Clapper Rail and California Black Rail* would avoid and minimize effects on California  
9 clapper rail. Therefore, California clapper rail habitat fragmentation would not have an adverse  
10 effect on the species.

11 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
12 movement would not represent an adverse effect on California clapper rail as a result of special-  
13 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be  
14 phased to allow for the recovery of some areas before restoration actions are initiated in other  
15 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
16 minimize effects on California clapper rail.

17 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
18 movement would represent a less-than-significant impact on California clapper rail as a result of  
19 special status species habitat modification because Tidal Natural Communities Restoration (CM4)  
20 would be phased to allow for the recovery of some areas before initiating restoration actions in  
21 other areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would  
22 avoid and minimize effects on California clapper rail.

### 23 **California Least Tern**

24 This section describe the effects of Alternative 1A, including water conveyance facilities  
25 construction and implementation of other conservation components on California least tern.  
26 California least tern modeled habitat identifies foraging habitat as all tidal perennial aquatic natural  
27 community in the study area. Breeding habitat is not included in the model because most of the  
28 natural shoreline in the study area that historically provided nesting sites has been modified or  
29 removed.

30 Construction and restoration associated with Alternative 1A conservation measures would result in  
31 both temporary and permanent losses of California least tern modeled habitat as indicated in Table  
32 12-1A-27. Full implementation of Alternative 1A would also include the following conservation  
33 actions over the term of the BDCP to benefit California least tern (BDCP Chapter 3, Section 3.3,  
34 *Biological Goals and Objectives*).

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

Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation).

As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat, in addition to natural community enhancement and management commitments (including CM12 *Methylmercury Management*) and implementation of AMM1–AMM7, AMM27 *Selenium Management*, and mitigation to avoid impacts on terns should they nest in the study area, impacts on the California least tern would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1A-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	48	48	133	133	NA	NA
<b>Total Impacts CM1</b>		<b>48</b>	<b>48</b>	<b>133</b>	<b>133</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	38	46	11	16	NA	NA
<b>Total Impacts CM2–CM18</b>		<b>38</b>	<b>46</b>	<b>11</b>	<b>16</b>	<b>NA</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>86</b>	<b>94</b>	<b>144</b>	<b>149</b>	<b>NA</b>	<b>NA</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

Alternative 1A conservation measures would result in the combined permanent and temporary loss of up to 243 acres (94 acres of permanent loss, 149 acres of temporary loss) of modeled foraging habitat for California least tern (Table 22-1A-27). The conservation measures that would result in these losses are construction of water conveyance facilities and operation (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management activities (CM11), which would include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate California least tern foraging habitat. Each of these individual activities is described below. A summary statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 1       • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
2 result in the combined permanent and temporary loss of up to 181 acres of modeled California  
3 least tern aquatic foraging habitat (Table 22-1A-27). Of the 181 acres of modeled habitat that  
4 would be removed for the construction of the conveyance facilities, 48 acres would be a  
5 temporary loss. Most of the permanent loss would occur where Intakes 1–5 encroach on the  
6 Sacramento River’s east bank between Freeport and Courtland. The temporary effects on  
7 California least tern foraging habitat would occur at numerous locations, including in the  
8 Sacramento River at Intakes 1–5, and at temporary barge unloading facilities established along  
9 the tunnel route. The CM1 footprint does not overlap with any California least tern occurrences.  
10 Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect*  
11 *Effects on Colonies Will Be Minimized*, (described below) would require preconstruction surveys  
12 and the establishment of no-disturbance buffers and would be available to address potential  
13 effects on terns were they to nest in the vicinity of the construction footprint. Refer to the  
14 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.  
15 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.
- 16       • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement  
17 (CM2) would result in the permanent loss of 8 acres and the temporary loss of 11 acres of  
18 modeled aquatic foraging habitat for California least tern in CZ 2. The loss is expected to occur  
19 during the first 10 years of Alternative 1A implementation.
- 20       • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the  
21 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An  
22 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,  
23 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial  
24 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP  
25 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with  
26 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to  
27 substantially increase the primary productivity of fish, increasing the prey base for California  
28 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years  
29 of BDCP implementation, which would coincide with the timeframe of water conveyance  
30 facilities construction. The remaining restoration would be phased over the following 30 years.  
31 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be  
32 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 33       • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
34 seasonally inundated floodplain would result in the permanent loss of 2 acres and the  
35 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This  
36 activity is scheduled to start following construction of water conveyance facilities, which is  
37 expected to take 10 years. Specific locations for the floodplain restoration have not been  
38 identified, but it is expected that much of the activity would occur in the south Delta along the  
39 major rivers.
- 40       • *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances  
41 during implementation of habitat management actions could result in temporary disturbances  
42 that affect California least tern use of the surrounding habitat. These effects cannot be  
43 quantified, but are expected to be minimal because few management activities would be  
44 implemented in aquatic habitat and because terns are not expected to nest on protected lands.  
45 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting  
46 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and

1 injury mortality and noise and visual disturbance of nesting terns would be avoided and  
2 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies*  
3 *Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized.*

- 4 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
5 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
6 post construction disturbances, localized impacts on California least tern foraging habitat, and  
7 temporary noise and disturbances over the term of the BDCP. Maintenance activities would  
8 include vegetation management, levee and structure repair, and re-grading of roads and  
9 permanent work areas which could be adjacent to California least tern foraging habitat. These  
10 effects, however, would be reduced by AMMs described below.

11 Injury and Direct Mortality: California least terns currently nest in the vicinity of potential  
12 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies  
13 could establish if suitable nesting habitat is created during restoration activities (e.g., placement  
14 of unvegetated fill to raise surface elevations prior to breaching levees during restoration  
15 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment  
16 for land clearing, construction, conveyance facilities operation and maintenance, and habitat  
17 restoration, enhancement, and management could result in injury or mortality of California least  
18 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-  
19 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the  
20 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals  
21 would be expected to avoid contact with construction equipment. However, injury or mortality  
22 would be avoided through planning and preconstruction surveys to identify nesting colonies,  
23 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot  
24 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*  
25 *Avoided and Indirect Effects on Colonies Will Be Minimized.*

26 The following paragraphs summarize the combined effects discussed above, describe other BDCP  
27 conservation actions that offset or avoid these effects. NEPA and CEQA conclusions area also  
28 included.

### 29 ***Near-Term Timeframe***

30 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
31 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
32 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
33 the effects of construction would not be adverse under NEPA. With Alternative 1A implementation,  
34 there would be a loss of 230 acres of modeled foraging habitat for California least tern in the study  
35 area in the near-term. These effects would result from the construction of the water conveyance  
36 facilities (CM1, 181 acres), and implementing other conservation measures (Yolo Bypass fisheries  
37 improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled foraging habitat  
38 impacts would occur in tidal perennial aquatic natural communities.

39 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
40 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
41 indicate that 230 acres of the tidal perennial aquatic natural community should be restored/created  
42 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of  
43 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore



1 require 49 acres of tidal perennial aquatic natural community restoration using the same typical  
2 NEPA and CEQA ratio (1:1 for restoration).

3 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
4 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3). This  
5 conservation action would result in the creation of approximately 3,400 acres of high-value tidal  
6 perennial aquatic natural community, based on modeling conducted by ESAPWA (refer to Table 5 in  
7 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*) (Tidal perennial aquatic restoration  
8 would occur in the same timeframe as the construction and early restoration losses, thereby  
9 avoiding adverse effects on California least tern from loss of foraging habitat.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
15 minimize the risk of affecting individuals and species habitats at or adjacent to work areas and  
16 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
17 *Measures*.

18 The California least tern is not a species that is covered under the BDCP. Although nesting by  
19 California least tern is not expected to occur, restoration sites could attract individuals wherever  
20 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly  
21 substrates with sparse vegetation). If nesting were to occur, construction activities could have an  
22 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*  
23 *Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would be available to  
24 address this potential effect on nesting California least terns.

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

26 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
27 habitat for California least tern. Alternative 1A as a whole would result in the permanent loss of and  
28 temporary effects on 243 acres of foraging habitat during the term of the Plan (less than 1% of the  
29 total habitat in the study area). The locations of these losses are described above in the analyses of  
30 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
31 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal  
32 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix  
33 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of  
34 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South  
35 Delta ROAs (see Figure 12-1).

36 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality  
37 associated with Alternative 1A would represent an adverse effect in the absence of other  
38 conservation actions. Although nesting by California least tern is not expected to occur in the study  
39 area, restoration sites could attract individuals wherever disturbed or where artificial sites mimic  
40 habitat conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If  
41 nesting were to occur, construction activities could have an adverse effect on California least tern.  
42 Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect*  
43 *Effects on Colonies*, would be available to address this potential effect on nesting California least  
44 terns. With habitat restoration associated with CM4, and with implementation of *AMM1 Worker*

1 *Awareness Training, AMM2 Construction Best Management Practices and Monitoring, AMM3*  
2 *Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*  
3 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable*  
4 *Tunnel Material, and Dredged Material, and AMM7 Barge Operations Plan, which would be in place*  
5 *throughout the construction period, the effects of Alternative 1A as a whole on California least tern*  
6 *would not be adverse under NEPA.*

7 **CEQA Conclusion:**

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
10 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
11 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
12 the effects of construction would be less than significant under CEQA. With Alternative 1A  
13 implementation, there would be a loss of 230 acres of modeled foraging habitat for California least  
14 tern in the study area in the near-term. These effects would result from the construction of the  
15 water conveyance facilities (CM1, 181 acres), and implementing other conservation measures (Yolo  
16 Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled  
17 foraging habitat impacts would occur in tidal perennial aquatic natural communities.

18 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
19 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
20 indicate that 230 acres of the tidal perennial aquatic natural community should be restored/created  
21 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of  
22 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore  
23 require 49 acres of tidal perennial aquatic natural community restoration using the same typical  
24 NEPA and CEQA ratio (1:1 for restoration).

25 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
26 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).  
27 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation  
28 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table  
29 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic  
30 restoration would occur in the same timeframe as the construction and early restoration losses,  
31 thereby avoiding adverse effects on California least tern.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
33 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
34 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan, AMM6 Spoils, Reusable Tunnel Material, and Dredged Material Disposal Plan,*  
36 *and AMM7 Barge Operations Plan.* All of these AMMs include elements that would avoid or minimize  
37 the risk of affecting individuals and species habitats at or adjacent to work areas and storage sites.  
38 The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures.*

39 Although nesting by California least tern is not expected to occur, restoration sites could attract  
40 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,  
41 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities  
42 could have an adverse effect on California least tern. Mitigation Measure BIO-66, *California Least*

1 *Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would  
2 reduce this impact on nesting California least terns to a less-than-significant level.

3 The natural community restoration and protection activities would be concluded in the first 10  
4 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
5 constitute adequate mitigation for CEQA purposes. In addition, AMM1-AMM7 and Mitigation  
6 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*  
7 *Colonies will be Minimized*, would avoid and minimize potential impacts on the species from  
8 construction-related habitat loss and noise and disturbance. Because the number of acres required  
9 to meet the typical mitigation ratio described above would be only 230 acres of restored tidal  
10 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the  
11 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat  
12 loss and direct mortality under Alternative 1A would be less than significant under CEQA.

### 13 ***Late Long-Term Timeframe***

14 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
15 habitat for California least tern. Alternative 1A as a whole would result in the permanent loss of and  
16 temporary effects on 243 acres of foraging habitat during the term of the Plan (less than 1% of the  
17 total habitat in the study area). The locations of these losses are described above in the analyses of  
18 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
19 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial  
20 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*  
21 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including  
22 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure  
23 12-1).

24 The loss of California least tern foraging habitat and potential direct mortality associated with  
25 Alternative 1A would represent a significant impact in the absence of other conservation actions.  
26 However, with habitat restoration associated with CM4, and with implementation of *AMM1 Worker*  
27 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*  
28 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*  
29 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *Reusable*  
30 *Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operations Plan*, and Mitigation Measure BIO-  
31 66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be*  
32 *Minimized*, the loss of habitat or mortality under this alternative would have a less-than-significant  
33 impact on California least tern.

### 34 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and** 35 **Indirect Effects on Colonies Will Be Minimized**

36 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging  
37 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist  
38 with experience observing the species and its nests conducts at least three preconstruction  
39 surveys for this species during the nesting season. DWR will design projects to avoid the loss of  
40 California least tern nesting colonies. No construction will take place within 500 feet of  
41 California least tern nests during the nesting season (April 15 to August 15 or as determined  
42 through surveys). Only inspection, maintenance, research, or monitoring activities may be

1 performed during the least tern breeding season in areas within or adjacent to least tern  
2 breeding habitat with USFWS and CDFW approval under the supervision of a qualified biologist.

### 3 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

4 **Indirect construction-and operation-related effects:** Indirect effects associated with  
5 construction that could affect California least tern include noise, dust, and visual disturbance caused  
6 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint  
7 but within 500 feet from the construction edge. Construction noise above background noise levels  
8 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
9 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
10 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
11 which these noise levels could affect California least tern. The use of mechanical equipment during  
12 water conveyance facilities construction could cause the accidental release of petroleum or other  
13 contaminants that could affect California least tern or their prey species in the surrounding habitat.  
14 The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also  
15 affect the species. Noise and visual disturbance is not expected to have an adverse effect on  
16 California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*  
17 *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern  
18 nests were found during planning or preconstruction surveys, no construction would take place  
19 within 500 feet of active nests. In addition, AMM1–AMM7, including construction best management  
20 practices, would minimize the likelihood of spills from occurring or excessive dust being created  
21 during construction. Should a spill occur, implementation of these AMMs would greatly reduce the  
22 likelihood of individuals being affected.

23 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation  
24 of mercury in avian species including the California least tern. The operational impacts of new flows  
25 under CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury  
26 concentration and bioavailability. Subsequently, a regression model was used to estimate fish-tissue  
27 concentrations under these future operational conditions (evaluated starting operations or ESO).  
28 Results indicated that changes in total mercury levels in water and fish tissues due to ESO were  
29 insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

30 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
31 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
32 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
33 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase  
34 bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
35 Increased methylmercury associated with natural community and floodplain restoration may  
36 indirectly affect California least tern, via uptake in lower trophic levels (as described in the BDCP,  
37 Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated with high tidal  
38 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers  
39 et al. 2008). The potential mobilization or creation of methylmercury within the Plan Area varies  
40 with site-specific conditions and would need to be assessed at the project level.

41 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting  
42 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were  
43 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from  
44 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially

1 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from  
2 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern  
3 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample  
4 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in  
5 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are  
6 representative of the population in the San Francisco Bay, they would not be expected to result in  
7 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern  
8 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

9 *CM12 Methylmercury Management* includes provisions for project-specific Mercury Management  
10 Plans. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
11 as monitoring and adaptive management as described in CM12 would be available to address the  
12 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on California  
13 least tern.

14 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
15 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
16 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
17 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
18 effect of selenium toxicity differs widely between species and also between age and sex classes  
19 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
20 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

21 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
22 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
23 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
24 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
25 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
26 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
27 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
28 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
29 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
30 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
31 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
32 levels of selenium have a higher risk of selenium toxicity.

33 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
34 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
35 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal  
36 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
37 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
38 restoration activities that create newly inundated areas could increase bioavailability of selenium  
39 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
40 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
41 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
42 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
43 difficult to determine whether the effects of potential increases in selenium bioavailability  
44 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse  
45 effects on California least tern.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a  
2 substantial effect on California least tern from increases in selenium associated with restoration  
3 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
4 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
5 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
6 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
7 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
8 separately for each restoration effort as part of design and implementation. This avoidance and  
9 minimization measure would be implemented as part of the tidal habitat restoration design  
10 schedule.

11 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from  
12 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation  
13 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
14 *Colonies Will Be Minimized*, would be available to address this potential effect. AMM1–AMM7,  
15 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
16 likelihood of spills from occurring and ensure that measures were in place to prevent runoff from  
17 the construction area and to avoid negative effects of dust on the species. Tidal habitat restoration  
18 could result in increased exposure of California least tern to selenium. This effect would be  
19 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
20 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
21 selenium and its bioavailability in tidal habitats. The indirect effects associated with noise and visual  
22 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
23 Alternative 1A implementation would not have an adverse effect on California least tern. Tidal  
24 habitat restoration could result in increased exposure of California least tern to methylmercury.  
25 However, it is unknown what concentrations of methylmercury are harmful to the species, and the  
26 potential for increased exposure varies substantially within the study area. Site-specific restoration  
27 plans that address the creation and mobilization of mercury, as well as monitoring and adaptive  
28 management as described in *CM12 Methylmercury Management*, would be available to address the  
29 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on California  
30 least tern. The site-specific planning phase of marsh restoration would be the appropriate place to  
31 assess the potential for risk of methylmercury exposure for California least tern, once site specific  
32 sampling and other information could be developed.

33 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities  
34 from the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation  
35 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
36 *Colonies Will Be Minimized*, would avoid and minimize impacts on potential nesting California least  
37 terns from noise and visual disturbance. The use of mechanical equipment during water conveyance  
38 facilities construction could cause the accidental release of petroleum or other contaminants that  
39 could affect California least tern if present in the surrounding habitat. The inadvertent discharge of  
40 sediment or excessive dust adjacent to California least tern habitat could also affect the species.  
41 These impacts on California least tern would be less than significant with the incorporation of  
42 AMM1–AMM7 into the BDCP. Tidal habitat restoration could result in increased exposure of  
43 California least tern to methylmercury. However, it is unknown what concentrations of  
44 methylmercury are harmful to the species. Sites-specific restoration plans that address the creation  
45 and mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
46 *Methylmercury Management*, would be available to address the uncertainty of methylmercury levels

1 in restored tidal marsh and potential impacts on California least tern. This effect would be  
2 addressed through the implementation of *AMM27 Selenium Management* which would provide  
3 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
4 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1A  
5 implementation would not have an adverse effect on California least tern.

6 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**  
7 **Indirect Effects on Colonies Will Be Minimized**

8 See Mitigation Measure BIO-66 under Impact BIO-66.

9 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**  
10 **Facilities**

11 New transmission lines would increase the risk for bird-power line strikes, which could result in  
12 injury or mortality of California least tern. This risk is considered to be minimal based on tern flight  
13 behaviors and its unlikely use of habitats near the transmission line corridors. Transmission line  
14 poles and towers also provide perching substrate for raptors, which could result in increased  
15 predation pressure on local California least terns. This would be expected to have few adverse  
16 effects on California least terns.

17 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
18 adverse effect on California least tern as a result of direct mortality of a special-status species  
19 because they are not known to be present in areas of disturbance and because the probability of  
20 bird-powerline strikes is unlikely due to tern flight behaviors.

21 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-  
22 than-significant impact on California least tern as a result of direct mortality of a special-status  
23 species because they are not known to be present in areas of disturbance and because the  
24 probability of bird-powerline strikes is unlikely due to tern flight behaviors.

25 **Greater Sandhill Crane**

26 This section describes the effects of Alternative 1A, including water conveyance facilities  
27 construction and implementation of other conservation components, on greater sandhill crane.  
28 Greater sandhill cranes in the study area are almost entirely dependent on privately owned  
29 agricultural lands for foraging. Long-term sustainability of the species is thus dependent on  
30 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining  
31 compatible agricultural practices, while sustaining and increasing the extent of other essential  
32 habitat elements such as night roosting habitat. The habitat model for greater sandhill crane  
33 includes "roosting and foraging" and "foraging" habitat. These habitat types include certain  
34 agricultural types, specific grassland types, irrigated pastures and hay crops, managed seasonal  
35 wetland, and other natural seasonal wetland. Roosting and foraging habitat includes known,  
36 traditional roost sites that also provide foraging habitat (BDCP Appendix 2.A *Covered Species*  
37 *Accounts*). Both temporary and permanent roost sites were identified for greater Sandhill crane.  
38 Permanent roosting and foraging sites are those used regularly, year after year, while temporary  
39 roosting and foraging sites are those used in some years. Factors included in assessing the loss of  
40 foraging habitat for the greater sandhill crane includes the relative habitat value of specific crop or  
41 land cover types, and proximity to known roost sites. Foraging habitat for greater sandhill crane

1 included crop types and natural communities up to 4 miles from known roost sites, within the  
2 boundary of the winter crane use area (BDCP Appendix 2A, *Covered Species Accounts*).

3 Construction and restoration associated with Alternative 1A conservation measures would result in  
4 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as  
5 indicated in Table 12-1A-28. Full implementation of Alternative 1A would also include the following  
6 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter  
7 3, Section 3.3, *Biological Goals and Objectives*).

- 8 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
9 least 80% maintained in very high-value types in any given year. This protected habitat will be  
10 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
11 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
12 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective  
13 GSHC1.1, associated with CM3).
- 14 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
15 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or  
16 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be  
17 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
18 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
19 habitat loss (Objective GSHC1.2, associated with CM3).
- 20 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
21 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
22 and local seasonal flood events. The wetlands will be located within 2 miles of existing  
23 permanent roost sites and protected in association with other protected natural community  
24 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
25 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 26 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge  
27 project boundary. The complexes will be no more than 2 miles apart and will help provide  
28 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each  
29 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane  
30 roosting habitat, and will be protected in association with other protected natural community  
31 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,  
32 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
33 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
34 support roosting cranes and provide highest-value foraging habitat, provided such substitution  
35 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for  
36 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 37 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
38 sites. The habitat will consist of active cornfields that are flooded following harvest to support  
39 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least  
40 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will  
41 be sited with consideration of the location of roosting habitat loss and will be in place prior to  
42 roosting habitat loss (Objective GSHC1.5, associated with CM3).
- 43 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
44 other native wildlife species (Objective CLNC1.1, associated with CM3).



- 1 • Target cultivated land conservation to provide connectivity between other conservation lands  
2 (Objective CLNC1.2, associated with CM3).
- 3 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
4 lands that occur in cultivated lands within the reserve system, including, water conveyance  
5 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

6 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
7 natural community enhancement and management commitments (including *CM12 Methylmercury*  
8 *Management*) and implementation of AMM1–AMM7, *AMM20 Greater Sandhill Crane*, *AMM27*  
9 *Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on  
10 the greater sandhill crane would be less than significant for CEQA purposes.

11 **Table 12-1A-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 1A**  
12 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	2	2	1	1	NA	NA
	Roosting and Foraging - Temporary	319	319	89	89	NA	NA
	Foraging	1,650	1,650	902	902	NA	NA
<b>Total Impacts CM1</b>		<b>1,972</b>	<b>1,972</b>	<b>992</b>	<b>992</b>		
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>2,776</b>	<b>4,408</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Roosting/Foraging - Permanent</b>		<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>Total Roosting/Foraging - Temporary</b>		<b>319</b>	<b>360</b>	<b>89</b>	<b>89</b>		
<b>Total Foraging</b>		<b>4,426</b>	<b>6,017</b>	<b>902</b>	<b>902</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>4,748</b>	<b>6,380</b>	<b>992</b>	<b>992</b>	<b>0</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**  
2 **Crane**

3 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
4 of up to 452 acres of modeled roosting and foraging habitat for greater sandhill crane (362 acres of  
5 permanent loss and 90 acres of temporary loss) and 6,919 acres of foraging habitat for greater  
6 sandhill crane (6,017 of permanent loss, 902 acres of temporary loss, Table 12-1A-28). Conservation  
7 measures that would result in these losses are conveyance facilities and transmission line  
8 construction, and establishment and use of borrow and spoil areas (CM1), Tidal Natural  
9 Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh  
10 Natural Community Restoration (CM10), and Natural Communities Enhancement and Management  
11 (CM11). The majority of habitat loss would result from water conveyance facility construction and  
12 conversion of habitat to tidal natural communities through CM4. Habitat enhancement and  
13 management activities through CM11, which include ground disturbance or removal of nonnative  
14 vegetation, could also result in local adverse habitat effects. In addition, maintenance activities  
15 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
16 facilities could degrade or eliminate greater sandhill crane modeled habitat. Each of these individual  
17 activities is described below. A summary statement of the combined impacts, NEPA effects and a  
18 CEQA conclusion follow the individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities as they  
20 are currently designed would result in the combined permanent loss of up to 2,964 acres of  
21 modeled greater sandhill crane habitat. This would consist of the permanent removal of 2 acres  
22 of permanent roosting and foraging habitat, 319 acres of temporary roosting and foraging  
23 habitat, and 1,650 acres of foraging habitat. Foraging habitat that would be permanently  
24 impacted by CM1 would consist of 648 acres of very high-value, 500 acres of high-value, and 370  
25 acres of medium-value foraging habitat (Table 12-1A-29). In addition, 1 acre of permanent  
26 roosting and foraging habitat, 89 acres of temporary roosting and foraging habitat, and 902  
27 acres of foraging habitat would be temporarily removed (Table 12-1A-28). The temporarily  
28 removed habitat would consist primarily of cultivated lands and it would be restored within 1  
29 year following construction. However, it would not necessarily be restored to its original  
30 topography and it could be restored as grasslands in the place of cultivated lands. CM1 activities  
31 that would result in temporary impacts would include temporary access roads, borrow and spoil  
32 sites, and work areas for construction.

33 The permanent roosting and foraging habitat that would be permanently removed is located on  
34 the south end of Staten Island and the loss would be from the installation of a permanent  
35 transmission line. The temporary roost site on Tyler Island would be permanently impacted by a  
36 RTM storage area, a tunnel shaft, and a permanent transmission line and temporarily impacted  
37 by a concrete batch plant, fuel station, temporary work area, and temporary transmission line.  
38 Staten Island is among the most significant crane use areas in the Delta (Littlefield and Ivey  
39 2000) and construction on or adjacent to Staten Island would be adverse in the absence of other  
40 conservation measures. Temporary roosts on Bouldin Island, Venice Island, and Bacon Island  
41 would also be impacted by the proposed footprint for temporary and permanent transmission  
42 lines.

43 Approximately 288 acres of the Tyler Island temporary roost site in addition to 406 acres of the  
44 permanent loss of foraging habitat would result from the storage of reusable tunnel material.  
45 This material would likely be moved to other sites for use in levee build-up and restoration, and  
46 the affected area would likely eventually be restored. While this effect is categorized as

1 permanent because there is no assurance that the material would eventually be moved, the  
2 effect would likely be temporary. The actual footprint of the storage areas required for reusable  
3 tunnel material is flexible, and the actual acreage of habitat affected by this activity could be  
4 reduced based on the height of the storage piles in addition to other considerations. The  
5 implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
6 *Material*, would require that the areas used for reusable tunnel material storage be minimized in  
7 crane foraging habitat and completely avoid crane roost sites.

8 The implementation of *AMM20 Greater Sandhill Crane* would require that all CM1 activities be  
9 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be  
10 accomplished either by siting activities outside of identified roost sites or by relocating the roost site  
11 if it consisted of cultivated lands (roost sites consisting of wetlands would not be subject to re-  
12 location). Relocated roost sites would be established prior to construction activities affecting the  
13 original roost site (as described in *AMM20 Greater Sandhill Crane*, BDCP Appendix 3C). Therefore  
14 there would be no loss of crane roosting and foraging habitat as a result of water conveyance facility  
15 construction once the facilities were fully designed. The potential for injury and direct mortality  
16 from electrical transmission facilities is addressed below under Impact BIO-70. The transmission  
17 line alignment under Alternative 1A is not fully designed and the final transmission line design  
18 would be determined in coordination with USFWS, CDFW, and a qualified crane biologist to achieve  
19 a performance standard of no net increase in bird strike hazard to greater sandhill cranes in the Plan  
20 Area (*AMM20 Greater Sandhill Crane*).

21 Other CM1 impacts on greater sandhill crane foraging habitat would occur from construction of  
22 Intakes 1-5, associated work areas and potential borrow and spoil sites, tunnel shafts, and tunnel  
23 work areas, barge unloading facilities, transmission line footprints, and concrete batch plants.  
24 Approximately 910 acres of the permanent impact on foraging habitat would occur from the  
25 construction of the intermediate forebay west of the Stone Lakes National Wildlife Refuge. The  
26 intermediate forebay would be located within 500 feet of traditional sandhill crane roosting and  
27 foraging habitat, which could cause cranes to abandon these roost sites. The indirect effects of noise  
28 and visual disturbance from construction and operation of CM1 water conveyance facilities is  
29 discussed under Impact BIO-71. Refer to the Terrestrial Biology Map Book for a detailed view of  
30 Alternative 1A construction locations.

1 **Table 12-1A-29. Total Amount of Permanently Affected Greater Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent (temporary)	Acres Affected by CM2–CM18 permanent (temporary)
Very high	Corn, rice	1,320 (348)	525 (0)
High	Alfalfa and alfalfa mixtures, mixed pasture, native pasture, wheat, other pasture, irrigated pasture, managed wetlands, native vegetation	51 (146)	1,732 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	384 (354)	1,018 (0)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	456 (196)	1,069 (0)
None	Vineyards, orchards	14 (26)	23 (0)

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23

- CM4 Tidal Natural Communities Restoration:* Based on the hypothetical tidal restoration footprint, this activity would result in the permanent loss or conversion of approximately 2,754 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of 78 acres of very high-value, 1,199 acres of high value, 855 acres of medium-value, and 558 acres of low-value foraging habitat (Table 12-1A-29). This loss would occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these areas. In CZ 5, loss of modeled habitat would occur along the western edge of the greater sandhill crane winter use area and therefore would not result in fragmentation of traditional crane habitats. Therefore fragmentation of habitat from tidal restoration activities would be expected to be minimal. Approximately 1,951 acres of foraging habitat would be impacted within the first 10 years of Alternative 1A implementation.
- CM8 Grassland Natural Community Restoration:* Approximately 300 acres of cultivated lands that provide foraging habitat for greater sandhill crane would be converted to grassland by the late long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration activities. The restored grasslands would continue to provide foraging habitat value for the greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of Plan implementation.

- 1       • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
2 conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill  
3 crane. A portion of the restored nontidal marsh would be expected to continue to provide  
4 roosting and foraging habitat value for the greater sandhill crane. However, some of this  
5 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open  
6 water that would be too deep to provide suitable roosting or foraging habitat. Approximately  
7 567 acres of habitat would be converted to nontidal marsh within the first 10 years of  
8 Alternative 1A implementation.
- 9       • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
10 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
11 habitats could result in localized ground disturbances that could temporarily remove small  
12 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
13 vegetation and road and other infrastructure maintenance activities, would be expected to have  
14 minor adverse effects on available habitat and would be expected to result in overall  
15 improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
16 these activities to result in direct mortality of greater sandhill crane would be minimized with  
17 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction  
18 of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
19 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
20 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
21 disturbed areas when and where possible. If new ground disturbance was necessary, greater  
22 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of  
23 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of  
24 Alternative 1A implementation).
- 25       • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
27 disturbances that could affect greater sandhill crane use of the surrounding habitat.  
28 Maintenance activities would include vegetation management, levee and structure repair, and  
29 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill  
30 cranes are sensitive to disturbance. However, potential impacts would be reduced by AMMs, and  
31 conservation actions as described below.
- 32       • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
33 direct mortality of greater sandhill crane if they were present in the Plan Area, because they  
34 would be expected to avoid contact with construction and other equipment. Potential effects  
35 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
36 The potential for injury and direct mortality from electrical transmission facilities is discussed  
37 below under Impact BIO-70.

38       The following paragraphs summarize the combined effects discussed above and describe other  
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
40 included.

#### 41       ***Near-Term Timeframe***

42       Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
44 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the

1 effects of construction would not be adverse under NEPA. Based on current design footprints, the  
2 Plan would remove 411 acres roosting and foraging habitat (321 acres of permanent loss, 90 acres  
3 of temporary loss) in the study area in the near-term. These effects would result from the  
4 construction of the water conveyance facilities (CM1). In addition, 6,069 acres of foraging habitat  
5 would be removed or converted in the near-term (CM1, 3,294 acres; *CM4 Tidal Natural Communities*  
6 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*  
7 *Enhancement and Management*—2,776 acres). Of these near-term acres of foraging habitat impact,  
8 4,529 acres would be moderate- to very high-value habitat (CM1, 2,602 acres, CM4-11, 1,927 acres).

9 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
10 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in  
11 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1  
12 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value  
13 foraging habitat. Using these ratios would indicate that 411 acres of greater roosting habitat should  
14 be restored/created and 411 acres should be protected to compensate for the CM1 losses of greater  
15 sandhill crane roosting and foraging habitat. In addition, 3,294 acres of high- to very high-value  
16 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-  
17 to very high-value foraging habitat. The near-term effects of other conservation actions would  
18 remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore require 1,927  
19 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and  
20 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
21 protection for the loss of foraging habitat).

22 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane  
23 roost sites were directly impacted by CM1 covered activities (including transmission lines and their  
24 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
25 result of water conveyance facility construction once the facilities were fully designed, which would  
26 avoid the CM1 impact on 53 acres of roosting and foraging habitat once the project design is final.  
27 Indirect effects of construction-related noise and visual disturbance are discussed below under  
28 Impact BIO-71.

29 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
30 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
31 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
32 the construction and early restoration losses. Up to 95 acres of roosting habitat would be created  
33 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
34 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
35 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
36 locations throughout the Greater Sandhill Crane Winter Use Area, and would be in place prior to  
37 roosting habitat loss. Of the 500 acres of managed wetlands to be created for roosting habitat, 320  
38 acres would be created in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter  
39 Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified with  
40 consideration of sea level rise and local seasonal flood events. These wetlands would be created  
41 within 2 miles of existing permanent roost sites and protected in association with other protected  
42 natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that will  
43 protect cranes from the types of disturbances that would otherwise result from adjacent roads and  
44 developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of crane  
45 roosting habitat would be constructed within the Stone Lakes NWR project boundary (BDCP  
46 Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes

1 and Cosumnes greater sandhill crane populations (Objective GSHC1.4). The large patch sizes of  
2 these wetland complexes would provide additional conservation to address the threats of vineyard  
3 conversion, urbanization to the east, and sea level rise to the west of greater sandhill crane  
4 wintering habitat.

5 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
6 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
7 BIO-69a, *Compensate for the Loss of Medium- to Very High-Value Greater Sandhill Crane Foraging*  
8 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
9 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were  
10 compensated for with appropriate crop types and natural communities.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
16 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
17 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 18 **Late Long-Term Timeframe**

19 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676  
20 acres of foraging habitat for greater sandhill crane. Alternative 1A as a whole would result in the  
21 permanent loss of and temporary effects on 462 acres of roosting and foraging habitat (2% of the  
22 total habitat in the study area) and 6,919 acres of foraging habitat (4% of the total habitat in the  
23 study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost by  
24 the late long-term timeframe would consist of 5,584 acres of medium- to very high-value foraging  
25 habitat. The locations of these losses are described above in the analyses of individual conservation  
26 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
27 were directly affected by water conveyance facilities including transmission lines and associated  
28 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
29 construction. However, it would not necessarily be restored to its original topography and it could  
30 result in the conversion of cultivated lands to grasslands.

31 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
32 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
33 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
34 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
35 GSHC1.1).

36 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
37 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
38 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
39 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
40 permanent roost sites and protected in association with other protected natural community types at  
41 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
42 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
43 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
44 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and

1 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
2 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
3 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One  
4 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of  
5 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and  
6 provide highest-value foraging habitat, provided such substitution is consistent with the long-term  
7 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large  
8 patch sizes of these wetland complexes would provide additional conservation to address the  
9 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
10 sandhill crane wintering habitat.

11 To compensate for near-term impacts on crane roosting and foraging habitat, 95 acres of roosting  
12 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).  
13 These roosts would consist of active cornfields that are flooded following harvest to support  
14 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields  
15 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use  
16 Area, but would be sited with consideration of the location of roosting habitat loss and would be in  
17 place prior to roosting habitat loss.

18 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
19 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
20 types in any given year (Objective GSHC1.1). To create additional high-value foraging habitat in the  
21 study area, 10% of these acres of protected foraging habitat would result from the conversion of  
22 low-value or nonhabitat areas to high- or very high-value habitat (Objective GSHC1.2). These acres  
23 of protected foraging habitat would be located within 2 miles of known roosting sites in CZs 3, 4, 5,  
24 and/or 6 and would consider sea level rise and local seasonal flood events, greater Sandhill crane  
25 population levels, and the location of foraging habitat loss. The patch size of these protected lands  
26 would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural habitat values  
27 change over time based largely on economically driven agricultural practices, protecting crane  
28 habitat would provide enhanced stability to agricultural habitat value within the crane use area that  
29 does not currently exist.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
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34 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
35 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
36 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

37 ***CEQA Conclusion:***

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30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

34 Considering Alternative 1A's protection and restoration provisions, in addition to Mitigation  
35 Measure BIO-69a, which would compensate for the loss of medium- to very high-value foraging  
36 habitat at a ratio of 1:1 prior to or concurrent with impacts, loss of habitat and direct mortality  
37 through implementation of Alternative 1A would not result in a substantial adverse effect through  
38 habitat modifications and would not substantially reduce the number or restrict the range of the  
39 species. Therefore, the alternative would have a less-than-significant impact on greater sandhill  
40 crane.

41 **Mitigation Measure BIO-69a: Compensate for the loss of Medium to Very High-Value**  
42 **Greater Sandhill Crane Foraging Habitat**

43 DWR will compensate for the loss of greater sandhill crane medium- to very high-value foraging  
44 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan

1 Area. Compensation must occur prior to or concurrent within the impacts to minimize the  
2 effects of habitat loss. The crop types and natural communities that are included in foraging  
3 habitat value categories are listed in Table 12-1A-29. Foraging habitat conservation must occur  
4 within the greater sandhill crane winter use area and the location of protected habitat or  
5 conservation easements must be preapproved by USFWS and CDFW.

6 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission**  
7 **Facilities**

8 Greater sandhill cranes are susceptible to collision with power lines and other structures during  
9 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,  
10 Brown and Drewien 1995, Manville 2005). New transmission lines installed in the study area would  
11 increase the risk for bird-power line strikes, which could result in injury or mortality of greater  
12 sandhill cranes. Both permanent and temporary electrical transmission lines would be constructed  
13 to supply construction and operational power to BDCP facilities. Typically, higher-voltage (230-  
14 kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub” transmission (69-kV) lines vary  
15 from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The Alternative 1A alignment  
16 would require the installation of approximately 52 miles of permanent transmission line (43 miles  
17 of 230-kV lines and 9 miles of 69-kV lines) extending north and south, through much of the crane  
18 use area. The temporary transmission lines would total approximately 48 miles (25 miles of 69-kV  
19 line and 23 miles of 12-kV line). Temporary lines would be removed after construction of the water  
20 conveyance facilities, within 10 years. Staten Island is one of the most important wintering sites for  
21 greater sandhill cranes in the Delta, and the proposed permanent and temporary transmission lines  
22 that would be constructed on Tyler Island and Staten Island would have the potential to  
23 substantially affect greater sandhill cranes.

24 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
25 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
26 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
27 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
28 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
29 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
30 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
31 the southwestern corner of the winter use area. This existing network of power lines in the study  
32 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
33 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
34 risk and have an adverse effect on the species in the absence of other conservation actions.

35 The potential mortality of greater sandhill crane in the area of the proposed transmission lines  
36 under Alternative 1A was estimated using collision mortality rates by Brown and Drewien (1995)  
37 and an estimate of potential crossings along the proposed lines (methods are described in BDCP  
38 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).  
39 Results indicate that in the absence of any line marking to increase visibility and reduce collision  
40 risk (i.e., without minimization measures), the average annual mortality of greater sandhill crane at  
41 permanent lines would be up to 124 fatalities per year and would be 110 fatalities per year at  
42 temporary lines.

43 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
44 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and

1 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
2 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
3 mortality rate would be estimated to decrease to 50 fatalities per year for the permanent lines and  
4 44 fatalities per year for the temporary lines.

5 The current proposed transmission line alignment under Alternative 1A is not fully designed, and  
6 line locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that  
7 the final transmission line alignment would not result in a net increase in bird strike risk to greater  
8 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the  
9 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating  
10 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter  
11 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,  
12 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be  
13 expected to reduce existing mortality and thus fully offset the overall population effects of new  
14 transmission lines. Designing the alignment to minimize risk and removing, relocating, or  
15 undergrounding existing lines would be given priority out of the above methods. With these  
16 measures and the proposed mitigation, and considering that the temporary lines would be removed  
17 within the first 10 years of plan implementation, the risk of greater sandhill crane mortality from  
18 transmission lines would be reduced substantially.

19 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
20 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
21 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
22 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
23 the estimated mortality rate would be 50 fatalities per year from permanent transmission lines and  
24 44 fatalities per year from temporary transmission lines. The current proposed transmission line  
25 alignment under Alternative 1A is not fully designed, and line locations are not final. The  
26 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
27 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
28 risk in the Plan Area. With *AMM20 Greater Sandhill Crane*, and considering that the temporary lines  
29 would be removed within the first 10 years of Plan implementation, the risk of mortality from  
30 collision with transmission lines would result in a less-than-significant impact on the greater  
31 sandhill crane population.

## 32 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

33 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
34 Noise and visual disturbances from the construction of water conveyance facilities and other  
35 conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work  
36 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
37 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
38 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
39 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise  
40 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These  
41 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
42 maintenance of aboveground facilities, and similar activities. These potential effects would be  
43 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3.C,  
44 *Avoidance and Minimization Measures*.

1 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
 2 result from the construction of the Alternative 1A water conveyance facilities on greater sandhill  
 3 crane (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
 4 *Conveyance Facility on Sandhill Crane*). The analysis addressed the potential noise effects on cranes,  
 5 and concluded that as much as 6,508-18,284 acres of crane habitat could potentially be affected by  
 6 general construction noise above baseline level (50–60 dBA). This would include 107–814 acres of  
 7 permanent crane roosting habitat, 761–2,063 acres of temporary crane roosting habitat, and 5,640–  
 8 15,407 acres of crane foraging habitat. In addition, 86–730 acres of permanent crane roosting  
 9 habitat, 252–1,118 acres of temporary crane roosting habitat, and 778–4,957 acres of crane foraging  
 10 habitat could be affected by noise from pile driving that would be above baseline level (50–60dBA,  
 11 Table 12-1A-30). The analysis was conducted based on the assumption that there would be direct  
 12 line-of-sight from sandhill crane habitat areas to the construction site, and, therefore, provides a  
 13 worst-case estimate of effects. In many areas the existing levees would partially or completely block  
 14 the line-of-sight and would function as effective noise barriers, substantially reducing noise  
 15 transmission. However, there is insufficient data to assess the effects that increased noise levels  
 16 would have on sandhill crane behavior.

17 **Table 12-1A-30. Greater Sandhill Crane Habitat Affected By General Construction and Pile Driving**  
 18 **Noise Under Alternative 1A (acres)**

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	107	814	86	730
Temporary Roosting	761	2,063	252	1,118
Foraging	5,640	15,407	778	4,957
Total Habitat	6,508	18,284	1,116	6,805

19  
 20 Evening and nighttime construction activities would require the use of extremely bright lights.  
 21 Nighttime construction could also result in headlights flashing into roost sites when construction  
 22 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
 23 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
 24 because of their height. Little data is available on the effects of impact of artificial lighting on  
 25 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
 26 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
 27 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
 28 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
 29 include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of photo-period  
 30 which might cause them to shift their physiology towards earlier migration and breeding (BDCP  
 31 Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes' overall  
 32 fitness and reproductive success (which could in turn have population-level impacts). A change in  
 33 photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and  
 34 might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP  
 35 Chapter 5, *Effects Analysis*).

36 The effects of noise and visual disturbance on greater sandhill crane would be minimized through  
 37 the implementation of *AMM20 Greater Sandhill Crane* (Appendix 3.C, *Avoidance and Minimization*

1 *Measures*). Activities within 0.75 mile of crane roosting habitat would reduce construction noise  
2 during night time hours (from one hour before sunset to one hour after sunrise) such that  
3 construction noise levels do not exceed 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent  
4 roosts during periods when the roost sites are available (flooded). In addition, the area of crane  
5 foraging habitat that would be affected during the day (from one hour after sunrise to one hour  
6 before sunset) by construction noise exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized.  
7 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of  
8 foraging habitat for every acre indirectly affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise  
9 contour. With these measures in place, indirect effects of noise and visual disturbance from  
10 construction activities are not expected to reduce the greater sandhill crane population in the study  
11 area.

12 The use of mechanical equipment during water conveyance facilities construction could cause the  
13 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the  
14 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater  
15 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*  
16 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that  
17 measures were in place to prevent runoff from the construction area and negative effects of dust on  
18 foraging habitat.

19 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
20 mercury in covered species, including greater sandhill crane. Marsh (tidal and nontidal) and  
21 floodplain restoration also have the potential to increase exposure to methylmercury. Mercury is  
22 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
23 subjected to regular wetting and drying such as tidal marshes and flood plains. Thus, BDCP  
24 restoration activities that create newly inundated areas could increase bioavailability of mercury  
25 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
26 associated with natural community and floodplain restoration may indirectly affect greater sandhill  
27 crane via uptake in lower trophic levels (BDCP Appendix 5.D, *Contaminants*). In general, the highest  
28 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
29 drying and associated anoxic conditions (Alpers et al. 2008). The potential mobilization or creation  
30 of methylmercury within the study area varies with site-specific conditions and would need to be  
31 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
32 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
33 management and monitoring, *CM12 Methylmercury Management* would be available to address the  
34 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on greater  
35 sandhill crane. The potential indirect effects of increased mercury exposure is likely low for greater  
36 sandhill crane for the following reasons: 1) greater sandhill cranes occur in the study area only  
37 during the nonbreeding winter months, 2) their primary foraging habitats in the study area are  
38 cultivated crops, and 3) the use of restored tidal wetlands by cranes is likely to be limited compared  
39 to seasonal managed wetlands.

40 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
41 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
42 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
43 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
44 effect of selenium toxicity differs widely between species and also between age and sex classes  
45 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
46 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

1 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
2 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
3 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
4 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
5 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
6 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
7 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
8 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
9 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
10 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
11 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
12 levels of selenium have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
15 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh  
16 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
17 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
18 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
19 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
20 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
21 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
22 long-term increases in selenium concentrations in water in the Delta under any alternative.  
23 However, it is difficult to determine whether the effects of potential increases in selenium  
24 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to  
25 adverse effects on greater sandhill crane.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a  
27 substantial effect on greater sandhill crane from increases in selenium associated with restoration  
28 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
29 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
30 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
31 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
32 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
33 separately for each restoration effort as part of design and implementation. This avoidance and  
34 minimization measure would be implemented as part of the tidal habitat restoration design  
35 schedule.

36 **CEQA Conclusion:** Crane habitat could be affected by general construction noise (13,421-43,125  
37 acres) and pile driving (1,989-14,111 acres) above baseline level (50–60 dBA). Construction in  
38 certain areas would take place 7 days a week and 24 hours a day and evening and nighttime  
39 construction activities would require the use of extremely bright lights, which could adversely affect  
40 roosting cranes by impacting their sense of photo-period and by exposing them to predators. The  
41 effects of noise and visual disturbances would be reduced through the implementation of *AMM20*  
42 *Greater Sandhill Crane* which would include requirements (described above) to minimize the effects  
43 of noise and visual disturbance on greater sandhill cranes. With these measures in place, in addition  
44 to AMM1–AMM7, noise and visual disturbances, potential spills of hazardous materials, increased  
45 dust and sedimentation, and operations and maintenance of the water conveyance facilities would  
46 have a less-than-significant impact on greater sandhill crane. The implementation of tidal natural



1 communities restoration or floodplain restoration could result in increased exposure of greater  
2 sandhill crane to methylmercury. The potential indirect effects of increased mercury exposure is  
3 likely low for greater sandhill crane for the following reasons: 1) greater sandhill cranes occur in the  
4 study area only during the nonbreeding winter months, 2) their primary foraging habitats in the  
5 study area are cultivated crops, and 3) the use of restored tidal wetlands by cranes is likely to be  
6 limited compared to seasonal managed wetlands. Site-specific restoration plans that address the  
7 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
8 in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
9 methylmercury levels in restored tidal marsh and potential impacts on greater sandhill crane. Tidal  
10 habitat restoration could result in increased exposure of greater sandhill crane to selenium. This  
11 effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
12 would provide specific tidal habitat restoration design elements to reduce the potential for  
13 bioaccumulation of selenium and its bioavailability in tidal habitats. With these measures in place,  
14 the indirect effects of plan implementation would have a less-than-significant impact on greater  
15 sandhill crane.

### 16 **Lesser Sandhill Crane**

17 This section describes the effects of Alternative 1A, including water conveyance facilities  
18 construction and implementation of other conservation components, on lesser sandhill crane. Lesser  
19 sandhill cranes in the study area are almost entirely dependent on privately owned agricultural  
20 lands for foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on  
21 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining  
22 compatible agricultural practices, while sustaining and increasing the extent of other essential  
23 habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane includes  
24 "roosting and foraging" and "foraging" habitat. These habitat types include suitable foraging and  
25 roosting habitat in the study area as certain agricultural types, specific grassland types, irrigated  
26 pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland. Roosting  
27 and foraging habitat includes traditional roost sites that are known to be used by sandhill cranes  
28 (both greater and lesser) and also provide foraging habitat. Detail regarding the roosting and  
29 foraging modeled habitat for both subspecies of sandhill crane is included in the BDCP (BDCP  
30 Appendix 2.A *Covered Species Accounts*). Both temporary and permanent roost sites were identified  
31 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,  
32 while temporary roosting and foraging sites are those used in some years. Factors included in  
33 assessing the loss of foraging habitat for the lesser sandhill crane considers the relative habitat value  
34 of specific crop or land cover types. Although both the greater and the lesser Sandhill crane use  
35 similar crop or land cover types, these provide different values of foraging habitat for the two  
36 subspecies based on proportional use of these habitats. Lesser sandhill cranes are less traditional  
37 than greater sandhill cranes and are more likely to move between different roost site complexes and  
38 different wintering regions (Ivey pers. comm.) The wintering range is ten times larger than the  
39 greater sandhill crane and their average foraging flight radius from roost sites is twice that of  
40 greater sandhill cranes. Because of this higher mobility, lesser sandhill cranes are more flexible in  
41 their use of foraging areas than the greater sandhill crane.

42 Construction and restoration associated with Alternative 1A conservation measures would result in  
43 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as  
44 indicated in Table 12-1A-31. Full implementation of Alternative 1A would include the following

1 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP Chapter 3,  
2 Section 3.3, *Biological Goals and Objectives*) that would also benefit the lesser sandhill crane.

- 3 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
4 least 80% maintained in very high-value types in any given year. This protected habitat will be  
5 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
6 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
7 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective  
8 GSHC1.1, associated with CM3).
- 9 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
10 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or  
11 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be  
12 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
13 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
14 habitat loss (Objective GSHC1.2, associated with CM3).
- 15 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
16 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
17 and local seasonal flood events. The wetlands will be located within 2 miles of existing  
18 permanent roost sites and protected in association with other protected natural community  
19 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
20 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 21 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge  
22 project boundary. The complexes will be no more than 2 miles apart and will help provide  
23 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each  
24 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane  
25 roosting habitat, and will be protected in association with other protected natural community  
26 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,  
27 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
28 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
29 support roosting cranes and provide highest-value foraging habitat, provided such substitution  
30 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for  
31 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 32 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
33 sites. The habitat will consist of active cornfields that are flooded following harvest to support  
34 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least  
35 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will  
36 be sited with consideration of the location of roosting habitat loss and will be in place prior to  
37 roosting habitat loss (Objective GSHC1.5, associated with CM3).
- 38 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
39 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 40 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
41 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
42 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 43 • Target cultivated land conservation to provide connectivity between other conservation lands  
44 (Objective CLNC1.2, associated with CM3).

- Maintain and protect the small patches of important wildlife habitats associated with cultivated lands that occur in cultivated lands within the reserve system, including, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including CM12 *Methylmercury Management*) and implementation of AMM1–AMM7, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on the lesser sandhill crane would be less than significant for CEQA purposes.

**Table 12-1A-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	2	2	1	1	NA	NA
	Roosting and Foraging - Temporary	319	319	89	89	NA	NA
	Foraging	2,225	2,225	1,069	1,069	NA	NA
<b>Total Impacts CM1</b>		<b>2,546</b>	<b>2,546</b>	<b>1,159</b>	<b>1,159</b>		
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,131	2	4	0	0
<b>Total Impacts CM2–CM18</b>		<b>3,610</b>	<b>12,172</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>
<b>Total Roosting and Foraging - Permanent</b>		<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>Total Roosting and Foraging - Temporary</b>		<b>319</b>	<b>360</b>	<b>89</b>	<b>89</b>		
<b>Total Foraging</b>		<b>5,835</b>	<b>14,356</b>	<b>1,071</b>	<b>1,073</b>		
<b>TOTAL IMPACTS</b>		<b>6,156</b>	<b>14,718</b>	<b>1,161</b>	<b>1,163</b>	<b>0</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**  
2 **Crane**

3 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
4 of up to 452 acres of modeled roosting and foraging habitat (362 acres of permanent loss and 90  
5 acres of temporary loss) and 15,426 acres of foraging habitat (14,356 acres of permanent loss and  
6 1,073 acres of temporary loss) for lesser sandhill crane (Table 12-1A-31). Conservation measures  
7 that would result in these losses are conveyance facilities and transmission line construction, and  
8 establishment and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements  
9 (CM2), Tidal Natural Communities Restoration (CM4), Grassland Natural Community Restoration  
10 (CM8), Nontidal Marsh Natural Community Restoration (CM10), and Natural Communities  
11 Enhancement and Management (CM11). The majority of habitat loss would result from water  
12 conveyance facility construction and conversion of habitat to tidal natural communities through  
13 CM4. Habitat enhancement and management activities through CM11, which include ground  
14 disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In  
15 addition, maintenance activities associated with the long-term operation of the water conveyance  
16 facilities and other BDCP physical facilities could degrade or eliminate lesser sandhill crane modeled  
17 habitat. Each of these individual activities is described below. A summary statement of the combined  
18 impacts, NEPA effects and a CEQA conclusion follow the individual conservation measure  
19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities as they  
21 are currently designed would result in the combined permanent and temporary loss of up to  
22 2,964 acres of modeled lesser sandhill crane habitat. This would consist of the permanent  
23 removal of 2 acres of permanent roosting and foraging habitat, 319 acres of temporary roosting  
24 and foraging habitat, and 2,225 acres of foraging habitat. Foraging habitat that would be  
25 permanently impacted by CM1 would consist of 1,320 acres of very high-value, 51 acres of high-  
26 value, and 384 acres of medium-value foraging habitat (Table 12-1A-32). In addition, 1 acre of  
27 permanent roosting and foraging habitat, 89 acres of temporary roosting and foraging habitat,  
28 and 1,069 acres of foraging habitat would be temporarily removed (Table 12-1A-31). The  
29 temporarily removed habitat would consist primarily of cultivated lands and it would be  
30 restored within 1 year following construction. However, it would not necessarily be restored to  
31 its original topography and it could be restored as grasslands in the place of cultivated lands.  
32 CM1 activities that would result in temporary impacts would include temporary access roads,  
33 borrow and spoil sites, and work areas for construction.

34 The permanent roosting and foraging habitat that would be permanently removed is located on  
35 the south end of Staten Island and the loss would be from the installation of a permanent  
36 transmission line. The temporary roost site on Tyler Island would be permanently impacted by a  
37 RTM storage area, a tunnel shaft, and a permanent transmission line and temporarily impacted  
38 by a concrete batch plant, fuel station, temporary work area, and temporary transmission line.  
39 Staten Island is among the most significant crane use areas in the Delta (Littlefield and Ivey  
40 2000) and construction on or adjacent to Staten Island would be adverse in the absence of other  
41 conservation measures. Temporary roosts on Bouldin Island, Venice Island, and Bacon Island  
42 would also be impacted by the proposed footprint for temporary and permanent transmission  
43 lines.

44 Approximately 288 acres of the Tyler Island temporary roost site in addition to 406 acres of the  
45 permanent loss of foraging habitat would result from the storage of reusable tunnel material.  
46 This material would likely be moved to other sites for use in levee build-up and restoration, and

1 the affected area would likely eventually be restored. While this effect is categorized as  
2 permanent because there is no assurance that the material would eventually be moved, the  
3 effect would likely be temporary. The actual footprint of the storage areas required for reusable  
4 tunnel material is flexible, and the actual acreage of habitat affected by this activity could be  
5 reduced based on the height of the storage piles in addition to other considerations. The  
6 implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, would require that the areas used for reusable tunnel material storage be minimized in  
8 crane foraging habitat and completely avoid crane roost sites.

9 The implementation of *AMM20 Greater Sandhill Crane* would require that all CM1 activities be  
10 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be  
11 accomplished either by siting activities outside of identified roost sites or by relocating the roost  
12 site if it consisted of cultivated lands (roost sites consisting of wetlands would not be subject to  
13 re-location). Relocated roost sites would be established prior to construction activities affecting  
14 the original roost site (as described in *AMM20 Greater Sandhill Crane*, BDCP Appendix 3C).  
15 Therefore there would be no loss of crane roosting and foraging habitat as a result of water  
16 conveyance facility construction once the facilities were fully designed. The potential for injury  
17 and direct mortality from electrical transmission facilities is addressed below under Impact BIO-  
18 73. The transmission line alignment under Alternative 1A is not fully designed and the final  
19 transmission line design would be determined in coordination with USFWS, CDFW, and a  
20 qualified crane biologist to achieve a performance standard of no net increase in bird strike  
21 hazard to greater sandhill cranes in the Plan Area (*AMM20 Greater Sandhill Crane*). This  
22 performance standard would similarly protect lesser sandhill cranes from transmission line  
23 impacts.

24 Other CM1 impacts on lesser sandhill crane foraging habitat would occur from construction of  
25 Intakes 1-5, associated work areas and potential borrow and spoil sites, tunnel shafts, and  
26 tunnel work areas, barge unloading facilities, transmission line footprints, and concrete batch  
27 plants. Approximately 910 acres of the permanent impact on foraging habitat would occur from  
28 the construction of the intermediate forebay west of the Stone Lakes National Wildlife Refuge.  
29 The intermediate forebay would be located within 500 feet of traditional sandhill crane roosting  
30 and foraging habitat, which could cause cranes to abandon these roost sites. The indirect effects  
31 of noise and visual disturbance from construction and operation of CM1 water conveyance  
32 facilities is discussed under Impact BIO-74. Refer to the Terrestrial Biology Map Book for a  
33 detailed view of Alternative 1A construction locations. Impacts from CM1 would occur within  
34 the first 10 years of Plan implementation.

1 **Table 12-1A-32. Total Amount of Lesser Sandhill Crane Foraging Habitat Affected by Habitat Value**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2–CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	1,320 (348)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	51 (146)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	384 (354)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	456 (196)	3,745 (2)
None	Vineyards, orchards	14 (26)	23 (0)

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- *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2. Lesser sandhill crane use in this area is less common than in the central Delta. Construction impacts from CM2 would occur within the first 10 years of Plan implementation.
  - *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration footprint, this activity would result in the permanent loss or conversion of approximately 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of 3,642 acres of very high-value, 1,529 acres of high-value, 2,040 acres of medium-value, and 2,983 acres of low-value foraging habitat (Table 12-4-32). Habitat loss would primarily occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less traditional than greater sandhill cranes and would be more adaptable to changes in land use. Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of Plan implementation.
  - *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1 acres of temporary loss). This impact would occur after the first 10 years of Plan implementation.

- 1       ● *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands  
2       (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be  
3       impacted by grassland restoration activities. The restored grasslands would continue to provide  
4       foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted  
5       within the first 10 years of plan implementation.
- 6       ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
7       conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill  
8       crane. A portion of the restored nontidal marsh would be expected to continue to provide  
9       roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored  
10      marsh would be unsuitable as it would lack emergent vegetation and consist of open water that  
11      would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of  
12      habitat would be converted to nontidal marsh within the first 10 years of Plan implementation.
- 13      ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
14      actions included in *CM11* that are designed to enhance wildlife values in restored or protected  
15      habitats could result in localized ground disturbances that could temporarily remove small  
16      amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
17      vegetation and road and other infrastructure maintenance activities, would be expected to have  
18      minor adverse effects on available habitat and would be expected to result in overall  
19      improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
20      these activities to result in direct mortality of lesser sandhill crane would be minimized with the  
21      implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of  
22      recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
23      Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
24      facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
25      disturbed areas when and where possible. If new ground disturbance was necessary, sandhill  
26      crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland  
27      foraging habitat (1 acre of which would be impacted within the first 10 years of plan  
28      implementation).
- 29      ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
30      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
31      disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance  
32      activities would include vegetation management, levee and structure repair, and re-grading of  
33      roads and permanent work areas. These effects, could be adverse as sandhill cranes are  
34      sensitive to disturbance. However, potential impacts would be reduced by AMMs, and  
35      conservation actions as described below.
- 36      ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
37      direct mortality of lesser sandhill crane if they were present in the study area, because they  
38      would be expected to avoid contact with construction and other equipment. Potential effects  
39      would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
40      Injury and mortality from electrical transmission facilities are described below under Impact  
41      BIO-73.

42      The following paragraphs summarize the combined effects discussed above and describe other  
43      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
44      included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Based on current design footprints, the  
6 Plan would remove 411 acres roosting and foraging habitat (321 acres of permanent loss, 90 acres  
7 of temporary loss) in the study area in the near-term. These effects would result from the  
8 construction of the water conveyance facilities (CM1). In addition, 6,906 acres of foraging habitat  
9 would be removed or converted in the near-term (CM1, 3,294 acres; *CM2 Yolo Bypass Fisheries*  
10 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*  
11 *Restoration*, and *CM11 Natural Communities Enhancement and Management*—3,612 acres). Of these  
12 near-term acres of foraging habitat impacted, 5,109 acres would be medium- to very high-value  
13 habitat (CM1, 2,602 acres, CM2-11, 2,507 acres).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
15 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
16 habitat. Using these ratios would indicate that 411 acres of lesser sandhill crane roosting habitat  
17 should be restored/created and 411 acres should be protected to compensate for the CM1 losses of  
18 lesser sandhill crane roosting and foraging habitat. In addition, 2,602 acres of high- to very high-  
19 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane  
20 medium- to very high-value foraging habitat. The near-term effects of other conservation actions  
21 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require  
22 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA  
23 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
24 protection for the loss of foraging habitat).

25 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
26 sites were directly impacted by CM1 covered activities (including transmission lines and their  
27 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
28 result of water conveyance facility construction once the facilities were fully designed, which would  
29 avoid the CM1 impact on 411 acres of roosting and foraging habitat once the project design is final.  
30 Indirect effects of construction-related noise and visual disturbance are discussed below under  
31 Impact BIO-74.

32 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
33 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
34 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
35 the construction and early restoration losses.

36 The BDCP also includes the following objectives for the greater sandhill crane which would also  
37 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
38 winter use areas.

39 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
40 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
41 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
42 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
43 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
44 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed



1 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
2 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
3 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
4 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
5 protected in association with other protected natural community types at a ratio of 2:1 upland to  
6 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
7 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
8 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
9 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide  
10 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective  
11 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation  
12 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west  
13 of greater sandhill crane wintering habitat.

14 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
15 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
16 *BIO-72, Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*  
17 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
18 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
19 compensated for with appropriate crop types and natural communities.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
25 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
26 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

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

28 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
29 acres of foraging habitat for lesser sandhill crane. Alternative 1A as a whole would result in the  
30 permanent loss of and temporary effects on 452 acres of roosting and foraging habitat (2% of the  
31 total habitat in the study area) and 15,426 acres of foraging habitat (6% of the total habitat in the  
32 study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by the  
33 late long-term timeframe would consist of 10,965 acres of medium- to very high-value foraging  
34 habitat. The locations of these losses are described above in the analyses of individual conservation  
35 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
36 were directly affected by water conveyance facilities including transmission lines and associated  
37 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
38 construction. However, it would not necessarily be restored to its original topography and it could  
39 result in the conversion of cultivated lands to grasslands.

40 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
41 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
42 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
43 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective

1 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser  
2 sandhill crane.

3 The BDCP also includes the following objectives for the greater sandhill crane which would also  
4 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
5 winter use areas.

6 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
7 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
8 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
9 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
10 permanent roost sites and protected in association with other protected natural community types at  
11 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
12 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
13 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
14 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
15 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
16 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
17 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
18 large patch sizes of these wetland complexes would provide additional conservation to address the  
19 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
20 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
21 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
22 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
23 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
24 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
25 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
26 loss.

27 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
28 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
29 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
30 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
31 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
32 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
33 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
34 economically driven agricultural practices, protecting crane habitat would provide enhanced  
35 stability to agricultural habitat value within the crane use area that does not currently exist.  
36 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these  
37 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
42 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
43 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
44 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

1 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential for direct mortality of this  
2 special status species under Alternative 1A would represent an adverse effect in the absence of  
3 other conservation actions. However, with habitat protection and restoration associated with *CM3*  
4 *Natural Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by  
5 biological goals and objectives for the species and by *AMM1–AMM7*, *AMM20 Greater Sandhill Crane*,  
6 which would be in place throughout the construction period, and Mitigation Measure BIO-72, which  
7 would be available to compensate for loss of medium- to very high-value foraging habitat, the effects  
8 of habitat loss and potential mortality on lesser sandhill crane would not be adverse under NEPA.

9 **CEQA Conclusion:**

10 **Near-Term Timeframe**

11 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
12 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
13 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
14 effects of construction would be less than significant under CEQA. Based on current design  
15 footprints, the Plan would remove 411 acres roosting and foraging habitat (321 acres of permanent  
16 loss, 90 acres of temporary loss) in the study area in the near-term. These effects would result from  
17 the construction of the water conveyance facilities (CM1). In addition, 6,906 acres of foraging habitat  
18 would be removed or converted in the near-term (CM1, 3,294 acres; *CM2 Yolo Bypass Fisheries*  
19 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*  
20 *Restoration*, and *CM11 Natural Communities Enhancement and Management—3,612 acres*). Of these  
21 near-term acres of foraging habitat impacted, 5,109 acres would be medium- to very high-value  
22 habitat (CM1, 2,602 acres, CM2-11, 2,507 acres).

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
24 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
25 habitat. Using these ratios would indicate that 411 acres of lesser sandhill crane roosting habitat  
26 should be restored/created and 411 acres should be protected to compensate for the CM1 losses of  
27 lesser sandhill crane roosting and foraging habitat. In addition, 2,602 acres of high- to very high-  
28 value foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane  
29 medium- to very high-value foraging habitat. The near-term effects of other conservation actions  
30 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require  
31 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA  
32 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
33 protection for the loss of foraging habitat).

34 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
35 sites were directly impacted by CM1 covered activities (including transmission lines and their  
36 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
37 result of water conveyance facility construction once the facilities were fully designed, which would  
38 avoid the CM1 impact on 411 acres of roosting and foraging habitat once the project design is final.  
39 Indirect effects of construction-related noise and visual disturbance are discussed below under  
40 Impact BIO-74.

41 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
42 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
43 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
44 the construction and early restoration losses.

1 The BDCP also includes the following objectives for the greater sandhill crane which would also  
2 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
3 winter use areas.

4 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
5 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
6 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
7 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
8 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
9 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
10 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
11 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
12 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
13 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
14 protected in association with other protected natural community types at a ratio of 2:1 upland to  
15 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
16 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
17 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
18 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide  
19 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective  
20 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation  
21 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west  
22 of greater sandhill crane wintering habitat.

23 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
24 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
25 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the  
26 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
27 compensated for with appropriate crop types and natural communities.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 35 ***Late Long-Term Timeframe***

36 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
37 acres of foraging habitat for lesser sandhill crane. Alternative 1A as a whole would result in the  
38 permanent loss of and temporary effects on 452 acres of roosting and foraging habitat (2% of the  
39 total habitat in the study area) and 15,426 acres of foraging habitat (6% of the total habitat in the  
40 study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by the  
41 late long-term timeframe would consist of 10,965 acres of medium- to very high-value foraging  
42 habitat. The locations of these losses are described above in the analyses of individual conservation  
43 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
44 were directly affected by water conveyance facilities including transmission lines and associated

1 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
2 construction. However, it would not necessarily be restored to its original topography and it could  
3 result in the conversion of cultivated lands to grasslands.

4 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
5 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
6 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
7 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
8 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser  
9 sandhill crane.

10 The BDCP also includes the following objectives for the greater sandhill crane which would also  
11 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
12 winter use areas.

13 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
14 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
15 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
16 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
17 permanent roost sites and protected in association with other protected natural community types at  
18 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
19 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
20 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
21 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
22 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
23 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
24 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
25 large patch sizes of these wetland complexes would provide additional conservation to address the  
26 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
27 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
28 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
29 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
30 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
31 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
32 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
33 loss.

34 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
35 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
36 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
37 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
38 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
39 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
40 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
41 economically driven agricultural practices, protecting crane habitat would provide enhanced  
42 stability to agricultural habitat value within the crane use area that does not currently exist. The  
43 acres of foraging habitat conservation under Objective GSHC1.1 would not be sufficient to  
44 compensate for the habitat losses of lesser sandhill crane foraging habitat by the late long-term  
45 timeframe. The implementation of Mitigation Measure BIO-72, would require that of the 48,625

1 acres of cultivated lands protected by the late long-term timeframe, sufficient acres were conserved  
2 in suitable crop types for lesser sandhill cranes.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

10 Considering Alternative 1A's protection and restoration provisions, in addition to Mitigation  
11 Measure BIO-72, which would compensate for the loss of medium- to very high-value foraging  
12 habitat at a ratio of 1:1, loss of habitat or direct mortality through implementation of Alternative 1A  
13 would not result in a substantial adverse effect through habitat modifications and would not  
14 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
15 would have a less-than-significant impact on lesser sandhill crane.

16 **Mitigation Measure BIO-72: Compensate for the loss of Medium- to Very High-Value**  
17 **Lesser Sandhill Crane Foraging Habitat**

18 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging  
19 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
20 Area. Compensation must occur prior to or concurrent with the impacts to minimize the effects  
21 of habitat loss. The crop types and natural communities that are included in foraging value  
22 categories are listed in Table 12-1A-32. Foraging habitat conservation must occur within 10  
23 kilometers of traditional sandhill crane roost sites and the location of protected habitat or  
24 conservation easements must be preapproved by CDFW.

25 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission**  
26 **Facilities**

27 Sandhill cranes are susceptible to collision with power lines and other structures during periods of  
28 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and  
29 Drewien 1995, Manville 2005). New transmission lines installed in the study area would increase  
30 the risk for bird-power line strikes, which could result in injury or mortality of lesser sandhill  
31 cranes. Both permanent and temporary electrical transmission lines would be constructed to supply  
32 construction and operational power to BDCP facilities. Typically, higher-voltage (230-kilovolt [kV])  
33 lines vary in height from 90 to 110 feet, while "sub" transmission (69-kV) lines vary from 50 to 70  
34 feet (Avian Power Line Interaction Committee 2006). The Alternative 1A alignment requires the  
35 installation of approximately 52 miles of permanent transmission line (43 miles of 230-kV lines and  
36 9 miles of 69-kV lines) extending north and south through much of the crane use area. The  
37 temporary transmission lines would total approximately 48 miles (25 miles of 69-kV line and  
38 23 miles of 12-kV line). Temporary lines would be removed after construction of the water  
39 conveyance facilities, within 10 years. Staten Island is one of the most important wintering sites for  
40 sandhill cranes in the Delta, and the proposed permanent and although lesser sandhill crane  
41 numbers fluctuate annually at roost sites, temporary transmission lines that would be constructed  
42 on Tyler Island and Staten Island would have the potential to substantially affect lesser sandhill  
43 cranes.

1 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
2 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
3 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
4 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
5 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
6 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
7 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
8 the southwestern corner of the winter use area. This existing network of power lines in the study  
9 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
10 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
11 risk and have an adverse effect on the species in the absence of other conservation actions.

12 The potential mortality of greater sandhill crane in the area of the proposed transmission lines  
13 under Alternative 1A was estimated using collision mortality rates by Brown and Drewien (1995)  
14 and an estimate of potential crossings along the proposed lines (methods are described in BDCP  
15 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).  
16 Results indicate that in the absence of any line marking to increase visibility and reduce collision  
17 risk (i.e., without minimization measures), the average annual mortality of greater sandhill crane at  
18 permanent lines would be up to 124 fatalities per year and would be 110 fatalities per year at  
19 temporary lines. Lesser sandhill cranes use the same roost sites as greater sandhill cranes. However,  
20 their numbers fluctuate greatly over the season as they are more mobile and use a broader  
21 landscape than greater sandhill cranes. Although the roost population sizes would fluctuate more  
22 for lesser sandhill cranes, one could expect that proportionally, the total number of potential  
23 fatalities for the lesser sandhill crane would be similar to those of the greater sandhill crane.

24 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
25 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
26 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
27 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
28 mortality rate is estimated to decrease to 50 fatalities per year for the permanent lines and 44  
29 fatalities per year for the temporary lines.

30 The current proposed transmission line alignment under Alternative 1A is not fully designed, and  
31 line locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that  
32 the final transmission line alignment would not result in a net increase in bird strike risk to greater  
33 sandhill cranes in the Plan Area. This performance standard would also protect lesser sandhill  
34 cranes from birdstrike impacts in the Plan Area and would be achieved by implementing any  
35 combination of the following: (1) siting new transmission lines in lower bird strike risk zones; (2)  
36 removing, relocating or undergrounding existing lines; (3) installing flight diverters on existing lines  
37 in the crane winter use area; and/or (4) for areas outside of the Stone Lakes National Wildlife  
38 Refuge project boundary, shifting locations of flooded areas that provide crane roosts to lower risk  
39 areas. This would be expected to reduce existing mortality and thus fully offset the overall  
40 population effects of new transmission lines. Designing the alignment to minimize risk and  
41 removing, relocating, or undergrounding existing lines would be given priority out of the above  
42 methods. With these measures and the proposed mitigation, and considering that the temporary  
43 lines would be removed within the first 10 years of plan implementation, the risk of lesser sandhill  
44 crane mortality from transmission lines would be reduced substantially.

1 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
2 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
3 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
4 mortality of lesser sandhill cranes. By incorporating line-marking devices on new transmission lines  
5 the estimated mortality rate for the greater sandhill crane would be 50 fatalities per year from  
6 permanent transmission lines and 44 fatalities per year from temporary transmission lines. Similar  
7 fatality rates would be expected for the lesser sandhill crane. The current proposed transmission  
8 line alignment under Alternative 1A is not fully designed, and line locations are not final. The  
9 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
10 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
11 risk in the Plan Area. With *AMM20 Greater Sandhill Crane*, and considering that the temporary lines  
12 would be removed within the first 10 years of plan implementation, the risk of mortality from  
13 collision with transmission lines would not result in an adverse effect on the lesser sandhill crane  
14 population.

15 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
16 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
17 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
18 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
19 the estimated mortality rate for the greater sandhill crane would be 43 fatalities per year from  
20 permanent transmission lines and 37 fatalities per year from temporary transmission lines. Similar  
21 fatality rates would be expected for the lesser sandhill crane. The current proposed transmission  
22 line alignment under Alternative 1A is not fully designed, and line locations are not final. The  
23 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
24 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
25 risk in the Plan Area. With *AMM20 Greater Sandhill Crane*, and considering that the temporary lines  
26 would be removed within the first 10 years of plan implementation, the risk of mortality from  
27 collision with transmission lines would result in a less-than-significant impact on the lesser sandhill  
28 crane population.

#### 29 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

30 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
31 Noise and visual disturbances from the construction of water conveyance facilities and other  
32 conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to work  
33 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
34 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
35 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
36 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise  
37 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These  
38 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
39 maintenance of aboveground facilities, and similar activities. These potential effects would be  
40 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3.C,  
41 *Avoidance and Minimization Measures*.

42 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
43 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
44 crane (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
45 *Conveyance Facility on Sandhill Crane*). The same methods were employed to addresses the potential



1 noise effects on cranes from Alternative 1A and to determine that as much as 6,508–18,284 acres of  
2 crane habitat could be affected by general construction noise above baseline level (50–60 dBA). This  
3 would include 107–814 acres of permanent crane roosting habitat, 761–2,063 acres of temporary  
4 crane roosting habitat, and 5,640–15,407 acres of crane foraging habitat. In addition, 86–730 acres  
5 of permanent crane roosting habitat, 252–1,118 acres of temporary crane roosting habitat, and 778–  
6 4,957 acres of crane foraging habitat could be affected by noise from pile driving that would be  
7 above baseline level (50–60dBA, Table 12-1A-30 under Impact-BIO-71). The analysis was conducted  
8 based on the assumption that there would be direct line-of-sight from sandhill crane habitat areas to  
9 the construction site, and, therefore, provides a worst-case estimate of effects. In many areas the  
10 existing levees would partially or completely block the line-of-sight and would function as effective  
11 noise barriers, substantially reducing noise transmission. However, there is insufficient data to  
12 assess the effects that increased noise levels would have on sandhill crane behavior. Similar  
13 acreages of lesser sandhill crane habitat would be expected to be indirectly affected. However, lesser  
14 sandhill cranes are less traditional in their winter roost sites and may be more likely to travel away  
15 from disturbed areas to roost and forage in more suitable habitat.

16 Evening and nighttime construction activities would require the use of extremely bright lights.  
17 Nighttime construction could also result in headlights flashing into roost sites when construction  
18 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
19 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
20 because of their height. Little data is available on the effects of impact of artificial lighting on  
21 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
22 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
23 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
24 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
25 include a reduction in the cranes' quality of nocturnal rest, and effects on their "sense of photo-  
26 period which might cause them to shift their physiology towards earlier migration and breeding."  
27 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes'  
28 overall fitness and reproductive success (which could in turn have population-level impacts). A  
29 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to  
30 forage and might increase their risk of power line collisions if they were to leave roosts before dawn  
31 (BDCP Chapter 5, *Effects Analysis*).

32 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the  
33 implementation of AMM20 (Appendix 3.C, *Avoidance and Minimization Measures*). Activities within  
34 0.75 mile of crane roosting habitat would reduce construction noise during night time hours (from  
35 one hour before sunset to one hour after sunrise) such that construction noise levels do not exceed  
36 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent roosts during periods when the roost  
37 sites are available (flooded). In addition, the area of crane foraging habitat that would be affected  
38 during the day (from one hour after sunrise to one hour before sunset) by construction noise  
39 exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized. Unavoidable noise related effects would be  
40 compensated for by the enhancement of 0.1 acre of foraging habitat for every acre indirectly  
41 affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise contour. With these measures in place,  
42 indirect effects of noise and visual disturbance from construction activities are not expected to  
43 reduce the lesser sandhill crane population in the study area.

44 The use of mechanical equipment during water conveyance facilities construction could cause the  
45 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the  
46 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser

1 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*  
2 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure  
3 that measures were in place to prevent runoff from the construction area and negative effects of  
4 dust on foraging habitat.

5 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
6 mercury in lesser sandhill crane. Marsh (tidal and nontidal) and floodplain restoration also have the  
7 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
8 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
9 such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that  
10 create newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3,  
11 *Conservation Strategy*, for details of restoration). Increased methylmercury associated with natural  
12 community and floodplain restoration may indirectly affect lesser sandhill crane via uptake in lower  
13 trophic levels (BDCP Appendix 5.D, *Contaminants*). The potential mobilization or creation of  
14 methylmercury within the study area varies with site-specific conditions and would need to be  
15 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
16 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
17 management and monitoring, *CM12 Methylmercury Management* would be available to address the  
18 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill  
19 crane. The potential indirect effects of increased mercury exposure is likely low for lesser sandhill  
20 crane for the following reasons: 1) lesser sandhill cranes occur in the study area only during the  
21 nonbreeding months, 2) their primary foraging habitats in the study area are cultivated crops, and  
22 3) the use of restored tidal wetlands by cranes is likely to be limited compared to seasonal managed  
23 wetlands.

24 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
25 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
26 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
27 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
28 effect of selenium toxicity differs widely between species and also between age and sex classes  
29 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
30 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

31 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
32 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
33 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
34 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
35 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
36 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
37 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
38 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
39 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
40 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
41 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
42 levels of selenium have a higher risk of selenium toxicity.

43 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
44 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
45 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh

1 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
2 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
3 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
4 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
5 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
6 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
7 long-term increases in selenium concentrations in water in the Delta under any alternative.  
8 However, it is difficult to determine whether the effects of potential increases in selenium  
9 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to  
10 adverse effects on lesser sandhill crane.

11 Because of the uncertainty that exists at this programmatic level of review, there could be a  
12 substantial effect on lesser sandhill crane from increases in selenium associated with restoration  
13 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
14 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
15 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
16 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
17 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
18 separately for each restoration effort as part of design and implementation. This avoidance and  
19 minimization measure would be implemented as part of the tidal habitat restoration design  
20 schedule.

21 **NEPA Effects:** Crane habitat could be affected by general construction noise (6,508–18,284 acres)  
22 and pile driving (1,116–6,805 acres) above baseline level (50–60 dBA). However, lesser sandhill  
23 cranes are less traditional in their winter roost sites and may be more likely to travel away from  
24 disturbed areas to roost in more suitable habitat. Construction in certain areas would take place 7  
25 days a week and 24 hours a day and evening and nighttime construction activities would require the  
26 use of extremely bright lights, which could adversely affect roosting cranes by impacting their sense  
27 of photo-period and by exposing them to predators. The effects of noise and visual disturbances  
28 would be reduced through the implementation of *AMM20 Greater Sandhill Crane*, which would  
29 include requirements (described above) to minimize the effects of noise and visual disturbance on  
30 sandhill cranes. With these measures in place, in addition to AMM1–AMM7, noise and visual  
31 disturbances, the potential for hazardous spills, increased dust and sedimentation, and operations  
32 and maintenance of the water conveyance facilities would not result in an adverse effect on the  
33 lesser sandhill crane. Tidal habitat restoration could result in increased exposure of lesser sandhill  
34 crane to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
35 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
36 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With these  
37 measures in place, the effects of noise and visual disturbance, potential spills of hazardous materials,  
38 and increased exposure to selenium would not have an adverse effect on lesser sandhill crane. The  
39 implementation of tidal natural communities restoration or floodplain restoration could result in  
40 increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of  
41 increased mercury exposure is likely low for lesser sandhill crane. However, it is unknown what  
42 concentrations of methylmercury are harmful to the species, and the potential for increased  
43 exposure varies substantially within the study area. Site-specific restoration plans that address the  
44 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
45 in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
46 methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill crane. The

1 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
2 potential for risk of methylmercury exposure for lesser sandhill crane, once site specific sampling  
3 and other information could be developed.

4 **CEQA Conclusion:** Crane habitat could be affected by general construction noise (13,421–43,125  
5 acres) and pile driving (1,989–14,111 acres) above baseline level (50–60 dBA). However, lesser  
6 sandhill cranes are less traditional in their winter roost sites and may be more likely to travel away  
7 from disturbed areas to roost in more suitable habitat. Construction in certain areas would take  
8 place 7 days a week and 24 hours a day and evening and nighttime construction activities would  
9 require the use of extremely bright lights, which could adversely affect roosting cranes by impacting  
10 their sense of photo-period and by exposing them to predators. The effects of noise and visual  
11 disturbances would be reduced through the implementation of *AMM20 Greater Sandhill Crane* which  
12 would include requirements (described above) to minimize the effects of noise and visual  
13 disturbance on sandhill cranes. The implementation of tidal natural communities restoration or  
14 floodplain restoration could result in increased exposure of lesser sandhill crane to methylmercury.  
15 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane.  
16 However, it is unknown what concentrations of methylmercury are harmful to the species, and the  
17 potential for increased exposure varies substantially within the study area. Site-specific restoration  
18 plans that address the creation and mobilization of mercury, as well as monitoring and adaptive  
19 management as described in *CM12 Methylmercury Management*, would be available to address the  
20 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill  
21 crane. Tidal habitat restoration could result in increased exposure of lesser sandhill crane to  
22 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
23 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
24 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With *AMM1–*  
25 *AMM7* and *AMM27 Selenium Management* in place, in addition to *CM12 Methylmercury Management*,  
26 indirect effects of Plan implementation would have a less-than-significant impact on lesser sandhill  
27 crane.

#### 28 **Least Bell's Vireo and Yellow Warbler**

29 This section describes the effects of Alternative 1A, including water conveyance facilities  
30 construction and implementation of other conservation components, on the least Bell's vireo and  
31 yellow warbler. Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and  
32 migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that  
33 contain a dense shrub component, including all willow-dominated alliances.

34 Construction and restoration associated with Alternative 1A conservation measures would result in  
35 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as  
36 indicated in Table 12-1A-33. Full implementation of Alternative 1A would also include the following  
37 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler  
38 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 39 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least  
40 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
41 associated with CM7).
- 42 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
43 10 (Objective VFRNC1.2, associated with CM7).
- 44 ● Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).

- Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2, associated with CM7).

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments and implementation of AMM1–AMM7, *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, and mitigation to minimize potential effects, impacts on least Bell's vireo and yellow warbler would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1A-33. Changes in Least Bell's Vireo and Yellow Warbler Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Migratory and breeding	30	30	17	17	NA	NA
<b>Total Impacts CM1</b>		<b>30</b>	<b>30</b>	<b>17</b>	<b>17</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Migratory and breeding	382	656	88	109	48–85	148
<b>Total Impacts CM2–CM18</b>		<b>382</b>	<b>656</b>	<b>88</b>	<b>109</b>	<b>48–85</b>	<b>148</b>
<b>TOTAL IMPACTS</b>		<b>412</b>	<b>686</b>	<b>105</b>	<b>126</b>	<b>48–85</b>	<b>148</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

### Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell's Vireo and Yellow Warbler

Alternative 1A conservation measures would result in the combined permanent and temporary loss of up to 812 acres of modeled habitat (686 acres of permanent loss and 126 acres of temporary loss) for least Bell's vireo and yellow warbler (Table 12-1A-33). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2), tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate least Bell's vireo and yellow warbler habitat. Each of these individual activities is described below. A summary statement of the combined

1 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure  
2 discussions.

- 3 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
4 result in the combined permanent and temporary loss of up to 47 acres of modeled least Bell's  
5 vireo and yellow warbler habitat (Table 12-1A-33). Of the 47 acres of modeled habitat that  
6 would be removed for the construction of the conveyance facilities, 30 acres would be a  
7 permanent loss and 17 acres would be a temporary loss of habitat. Activities that would impact  
8 modeled habitat consist of tunnel, forebay, and intake construction, temporary access roads, and  
9 construction of transmission lines. Most of the permanent loss would occur where Intakes 1–5  
10 impact the Sacramento River's east bank between Freeport and Courtland. The riparian areas  
11 here are very small patches, some dominated by valley oak and others by nonnative trees.  
12 Temporary losses would occur where pipelines cross Snodgrass Slough and other small  
13 waterways east of the Sacramento River, and where temporary work areas surround intake  
14 sites. The riparian habitat in these areas is also composed of very small patches or stringers  
15 bordering waterways, which are composed of valley oak and scrub vegetation. Impacts from  
16 CM1 would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. There are no occurrences  
17 of least Bell's vireo or yellow warbler that intersect with the CM1 footprint. Refer to the  
18 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.  
19 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.
- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements  
21 (CM2) would permanently remove approximately 83 acres and temporarily remove 88 acres of  
22 modeled least Bell's vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is  
23 expected to occur during the first 10 years of Alternative 1A implementation.
- 24 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
25 inundation would permanently remove an estimated 545 acres of modeled least Bell's vireo and  
26 yellow warbler habitat.
- 27 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
28 seasonally inundated floodplain would permanently remove approximately 28 acres and  
29 temporarily remove 21 acres of modeled least Bell's vireo and yellow warbler habitat. Based on  
30 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill  
31 riparian habitat would be restored as a component of seasonally inundated floodplain  
32 restoration actions.  
33 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore  
34 may differ from these estimates, depending on how closely the actual outcome of tidal habitat  
35 restoration approximates the assumed outcome. However, riparian restoration from CM4 and  
36 CM5 would increase the extent of least Bell's vireo and yellow warbler habitat within the Plan  
37 Area once the restored riparian vegetation has developed habitat functions for these species.
- 38 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
39 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
40 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
41 activity would occur along waterway margins where riparian habitat stringers exist, including  
42 levees and channel banks. The improvements would occur within the study area on sections of  
43 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

1 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
2 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats  
3 are expected to maintain and improve the functions of the habitat over the term of the BDCP.  
4 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in  
5 protected habitat, which would maintain conditions favorable for future species establishment  
6 in the Plan Area. If least Bell's vireo and yellow warbler established breeding populations in  
7 restored riparian habitats in the Plan Area, occupied habitat would be monitored to determine if  
8 there were a need to implement controls on brood parasites (brown-headed cowbird) or nest  
9 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and  
10 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the  
11 stability of newly established populations.

12 Habitat management- and enhancement-related activities could disturb least Bell's vireo and  
13 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment  
14 operation could destroy nests, and noise and visual disturbances could lead to their  
15 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to  
16 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the  
17 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
18 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
19 *Surveys and Avoid Disturbance of Nesting Birds*.

20 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
21 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
22 disturbance that could affect least Bell's vireo and yellow warbler use of the surrounding  
23 habitat. Maintenance activities would include vegetation management, levee and structure  
24 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
25 reduced by AMMs and conservation actions as described below.

26 • *Injury and Direct Mortality*: Although least Bell's vireo nesting has not been confirmed in the  
27 Plan Area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife  
28 Refuge suggest that the reestablishment of a breeding population is a possibility over the  
29 duration of the BDCP. Construction-related activities would not be expected to result in direct  
30 mortality of least Bell's vireo or yellow warbler because adults and fledged young would be  
31 expected to avoid contact with construction and other equipment. However, if either species  
32 were to nest in the construction area, equipment operation, noise and visual disturbances could  
33 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. These  
34 effects on least Bell's vireo would be avoided and minimized with the implementation of *AMM22*  
35 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*.  
36 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*  
37 *of Nesting Birds*, would be available to address potential effects on nesting yellow warblers.

38 • Temporarily affected areas would be restored as riparian habitat within 1 year following  
39 completion of construction activities. Although the effects are considered temporary, the  
40 restored riparian habitat would require a period of time for ecological succession to occur and  
41 for restored riparian habitat to functionally replace habitat that has been affected. However,  
42 restored riparian vegetation can have the habitat structure to support breeding vireos within 3  
43 to 5 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus  
44 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian  
45 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced  
46 riparian vegetation would be expected to have structural components comparable to the

1 temporarily removed vegetation within the first 5 to 10 years after the initial restoration  
2 activities are complete.

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

### 6 ***Near-Term Timeframe***

7 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
8 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
9 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
10 effects of construction would not be adverse under NEPA. The Plan would remove 517 acres of  
11 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These  
12 effects would result from the construction of the water conveyance facilities (CM1, 47 acres of  
13 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements  
14 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of  
15 habitat).

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
17 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
18 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
19 successional valley/foothill riparian habitat. Using these ratios would indicate that 47 acres of  
20 valley/foothill riparian habitat should be restored/created and 47 acres should be protected to  
21 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects  
22 of other conservation actions would remove 470 acres of modeled habitat, and therefore require  
23 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using  
24 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

25 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
26 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
27 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
28 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
29 least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in  
30 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
31 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation*  
32 *Strategy*). This restoration would provide the large contiguous patches needed for suitable least  
33 Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian  
34 restoration also include the restoration, maintenance and enhancement of structural heterogeneity  
35 with adequate vertical and horizontal overlap among vegetation components and over adjacent  
36 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These Plan  
37 objectives represent performance standards for considering the effectiveness of CM7 restoration  
38 and CM3 protection actions. The acres of protection contained in the near-term Plan goals and the  
39 additional detail in the biological objectives for least Bell's vireo satisfy the typical mitigation ratios  
40 that would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of  
41 the other conservation measures. The restored riparian habitat could require 5 years to several  
42 decades, for ecological succession to occur and for restored riparian habitat to functionally replace  
43 habitat that has been affected. However, because the modeled habitat impacted largely consists of  
44 small patches of blackberry, willow, and riparian scrub, and because least Bell's vireo and yellow



1 warbler are not known to be established breeders in the study area, BDCP actions would not be  
2 expected to have an adverse population-level effect on either species.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
4 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
5 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
8 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
9 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
10 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
11 *Measures.* The yellow warbler is not a species that is covered under the BDCP. Although  
12 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
13 in the study area over the course of the BDCP), in order to have a less than adverse effect on  
14 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
15 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to  
16 address potential effects on nesting yellow warblers.

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

18 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
19 habitat for least Bell's vireo and yellow warbler. Alternative 1A as a whole would result in the  
20 permanent loss of and temporary effects on 812 acres of habitat for these species during the term of  
21 the Plan (7% of the total habitat in the study area). These losses would occur from the construction  
22 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*  
23 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The  
24 locations of these losses would be in fragmented riparian habitat throughout the study area.

25 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
26 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
27 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
28 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
29 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
30 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
31 in the Plan for riparian restoration also include the maintenance and enhancement of structural  
32 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
33 the least Bell's vireo and yellow warbler.

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
35 and protection actions discussed above could result in the restoration of 1,000 acres and the  
36 protection of 593 acres of habitat for the least Bell's vireo, which would also be suitable habitat for  
37 the yellow warbler.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
39 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
40 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
41 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
42 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
43 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
44 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and

1 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
2 *Measures*.

3 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality  
4 of these special-status species under Alternative 1A would represent an adverse effect in the  
5 absence of other conservation actions. However, these species are not established breeders in the  
6 study area and impacts would likely be limited to loss of migratory habitat. In addition, with habitat  
7 protection and restoration associated with CM3 and CM7, guided by biological goals and objectives  
8 and by *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*  
9 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*  
10 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*  
11 *Reusable Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM22 Suisun*  
12 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* which would be  
13 in place throughout the construction period, the effects of habitat loss and potential mortality on  
14 least Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 1A would not be  
15 adverse under NEPA. The yellow warbler is not a species that is covered under the BDCP and the  
16 potential for mortality would be adverse without preconstruction surveys to ensure that nests are  
17 detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
21 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
22 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
23 the impacts of construction would be less than significant under CEQA. The Plan would remove 517  
24 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term.  
25 These effects would result from the construction of the water conveyance facilities (CM1, 47 acres of  
26 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements  
27 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of  
28 habitat).

29 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
30 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
31 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
32 successional valley/foothill riparian habitat. Using these ratios would indicate that 47 acres of  
33 valley/foothill riparian habitat should be restored/created and 47 acres should be protected to  
34 mitigate the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects of  
35 other conservation actions would remove 470 acres of tidal natural communities, and therefore  
36 require 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill  
37 riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

38 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
39 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
40 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
41 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
42 least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in  
43 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
44 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*

1 *Strategy*). This restoration would provide the large contiguous patches needed for suitable least  
 2 Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian  
 3 restoration also include the restoration, maintenance and enhancement of structural heterogeneity  
 4 with adequate vertical and horizontal overlap among vegetation components and over adjacent  
 5 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These Plan  
 6 objectives represent performance standards for considering the effectiveness of CM7 restoration  
 7 and CM3 protection actions. biological goals and objectives would inform the near-term protection  
 8 and restoration efforts and represent performance standards for considering the effectiveness of  
 9 restoration actions. The acres of protection contained in the near-term Plan goals and the additional  
 10 detail in the biological objectives for least Bell's vireo satisfy the typical mitigation ratios that would  
 11 be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
 12 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
 13 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
 14 has been affected. However, because the modeled habitat impacted largely consists of small patches  
 15 of blackberry, willow, and riparian scrub, and because least Bell's vireo and yellow warbler are not  
 16 known to be established breeders in the study area, BDCP actions would not be expected to have an  
 17 adverse population-level effect on either species.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
 19 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
 20 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
 21 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
 22 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
 23 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
 24 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
 25 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
 26 *Measures.* The yellow warbler is not a species that is covered under the BDCP. Although  
 27 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
 28 in the Plan Area over the course of the BDCP), in order to have a less than adverse effect on  
 29 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
 30 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the  
 31 potential impact on nesting yellow warblers to a less-than-significant impact, should they become  
 32 established in the Plan Area.

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

34 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
 35 habitat for least Bell's vireo and yellow warbler. Alternative 1A as a whole would result in the  
 36 permanent loss of and temporary effects on 812 acres of habitat for these species during the term of  
 37 the Plan (7% of the total habitat in the study area). These losses would occur from the construction  
 38 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*  
 39 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The  
 40 locations of these losses would be in fragmented riparian habitat throughout the study area.

41 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
 42 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
 43 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
 44 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
 45 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense

1 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
2 in the Plan for riparian restoration also include the maintenance and enhancement of structural  
3 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
4 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to  
5 several decades, for ecological succession to occur and for restored riparian habitat to functionally  
6 replace habitat that has been affected. Therefore, there would be a time-lag before the restored  
7 habitat would benefit either species. However, neither species are established breeders in the study  
8 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow  
9 warbler.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
11 and protection actions discussed above could result in the restoration of 1,000 acres and the  
12 protection of 593 acres of habitat for the least Bell's vireo, which would also be suitable habitat for  
13 the yellow warbler.

14 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these  
15 special-status species under Alternative 1A would represent an adverse effect in the absence of  
16 other conservation actions. However, neither species are established breeders in the study area and  
17 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.  
18 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by  
19 biological goals and objectives and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best*  
20 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*  
21 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*  
22 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge*  
23 *Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
24 *Yellow-Billed Cuckoo*, which would be in place throughout the construction period, the effects of  
25 habitat loss and potential mortality on least Bell's vireo under Alternative 1A would be less than  
26 significant. The yellow warbler is not a species that is covered under the BDCP. Although  
27 preconstruction surveys for least Bell's vireo may also detect nesting yellow warblers, in order to  
28 have a less-than-significant impact on individuals, preconstruction surveys for noncovered avian  
29 species would be required to ensure that yellow warbler nests are detected and avoided. Mitigation  
30 Measure BIO-75 would reduce this potential impact on nesting yellow warblers, if present in the  
31 study area, to a less-than-significant level.

### 32 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 33 **Disturbance of Nesting Birds**

34 To reduce impacts on nesting birds, DWR will implement the measures listed below.

- 35 • To the maximum extent feasible, vegetation (trees, shrubs, ruderal areas) removal and  
36 trimming will be scheduled during the nonbreeding season of birds (September 1–January  
37 31). If vegetation removal cannot be removed in accordance with this timeframe,  
38 preconstruction/preactivity surveys for nesting birds and additional protective measures  
39 will be implemented as described below.
- 40 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting  
41 surveys before the start of construction. A minimum of three separate surveys will be  
42 conducted within 30 days prior to construction, with the last survey within 3 days prior to  
43 construction. Surveys will include a search of all suitable nesting habitat (trees, shrubs,  
44 ruderal areas, field crops) in the construction area. In addition, a 500-foot area around the

1 project area will be surveyed for nesting raptors, and a 250-foot buffer area will be surveyed  
2 for other nesting birds. If no active nests are detected during these surveys, no additional  
3 measures are required.

- 4 • If active nests are found in the survey area, no-disturbance buffers will be established  
5 around the nest sites to avoid disturbance or destruction of the nest site until the end of the  
6 breeding season (approximately September 1) or until a qualified wildlife biologist  
7 determines that the young have fledged and moved out of the project area (this date varies  
8 by species). A qualified wildlife biologist will monitor construction activities in the vicinity  
9 of the nests to ensure that construction activities do not affect nest success. The extent of the  
10 buffers will be determined by the biologists in coordination with USFWS and CDFW and will  
11 depend on the level of noise or construction disturbance, line-of-sight between the nest and  
12 the disturbance, ambient levels of noise and other disturbances, and other topographical or  
13 artificial barriers. Suitable buffer distances may vary between species.

#### 14 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

15 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily  
16 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the  
17 affected habitat's extent and functions. Because there are only two recent occurrences of least Bell's  
18 vireo within the Plan Area, and no occurrences of yellow warbler breeding in the Plan Area, future  
19 occupancy would likely consist of only a small number of individuals, and any such habitat  
20 fragmentation is expected to have no or minimal effect on the species.

21 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the Plan  
22 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation  
23 resulting from ground-disturbing operations would not have an adverse effect on least Bell's vireo  
24 or yellow warbler.

25 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the Plan  
26 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation  
27 resulting from ground-disturbing operations would have a less-than-significant impact on least  
28 Bell's vireo or yellow warbler.

#### 29 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical** 30 **Transmission Facilities**

31 New transmission lines would increase the risk for bird-power line strikes, which could result in  
32 injury or mortality of least Bell's vireo and yellow warbler. While both species could recolonize the  
33 study area during the permit term, recolonization would be expected to result primarily in response  
34 to BDCP riparian restoration, which would occur largely in CZ 7, which does not overlap with the  
35 proposed footprint for new transmission lines. The lack of occurrences in the study area, the lack of  
36 current and future higher value habitat patches in the vicinity of the proposed transmission lines,  
37 and the behavior and habitat requirements of least Bell's vireo and yellow warbler make collision  
38 with the proposed transmission lines highly unlikely.

39 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse  
40 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is  
41 unlikely due to the lack of occurrences in the study area, the lack of current and future higher value

1 habitat patches in the vicinity of the proposed transmission lines, and the behavior and habitat  
2 requirements of these species.

3 **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-  
4 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline  
5 strikes is unlikely due to the lack of occurrences in the study area, the lack of current and future  
6 higher value habitat patches in the vicinity of the proposed transmission lines, and the behavior and  
7 habitat requirements of these species.

8 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow**  
9 **Warbler**

10 **Indirect construction- and operation-related effects:** If least Bell's vireo or yellow warbler were  
11 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
12 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
13 functions of suitable nesting habitat for these species. Construction noise above background noise  
14 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
15 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
16 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
17 the extent to which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun*  
18 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce  
19 the potential for adverse effects of construction-related activities on survival and productivity of  
20 nesting least Bell's vireo and a 500 foot no-disturbance buffer would be established around the  
21 active nest. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
22 *Disturbance of Nesting Birds*, would be available to reduce the potential for adverse effects of  
23 construction-related activities on nesting yellow warbler. The use of mechanical equipment during  
24 water conveyance facilities construction could cause the accidental release of petroleum or other  
25 contaminants that could affect least Bell's vireo and yellow warbler in the surrounding habitat. The  
26 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
27 adverse effect on these species. *AMM2 Construction Best Management Practices and Monitoring*  
28 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
29 from the construction area and negative effects of dust on active nests.

30 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
31 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and  
32 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.  
33 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,  
34 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains  
35 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could  
36 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
37 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
38 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
39 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow  
40 warbler, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

41 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
42 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
43 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
44 restoration plans that address the creation and mobilization of mercury, as well as monitoring and

1 adaptive management as described in CM12 would be available to address the uncertainty of  
2 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow  
3 warbler.

4 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,  
5 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be  
6 adverse with the implementation of AMM1-AMM7, and AMM22 *Suisun Song Sparrow, Yellow-*  
7 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*  
8 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
9 address potential effects on nesting yellow warblers. The implementation of tidal natural  
10 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
11 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
12 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
13 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
14 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
15 address the uncertainty of methylmercury levels in restored tidal marsh and potential effects of  
16 methylmercury on least Bell's vireo and yellow warbler.

17 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
18 operations and maintenance of the water conveyance facilities would have a less-than-significant  
19 impact on least Bell's vireo and yellow warbler with the implementation of AMM2 *Construction Best*  
20 *Management Practices and Monitoring, AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
21 *Bell's Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction*  
22 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*. The implementation of tidal natural  
23 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
24 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
25 unknown what concentrations of methylmercury are harmful to these species. Sites-specific  
26 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
27 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
28 address the uncertainty of methylmercury levels in restored tidal marsh and potential impacts on  
29 least Bell's vireo and yellow warbler.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
31 **Disturbance of Nesting Birds**

32 See Mitigation Measure BIO-75 under Impact BIO-75.

33 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**  
34 **Habitat as a Result of Implementation of Conservation Components**

35 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
36 duration of inundation of approximately 48-85 acres of modeled least Bell's vireo and yellow  
37 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,  
38 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat  
39 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and  
40 inundation would be within the tolerance of these vegetation types.

41 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
42 construction of setback levees could result in periodic inundation of up to 148 acres of modeled  
43 least Bell's vireo and yellow warbler habitat in CZ 7. Inundation of restored floodplains would not be

1 expected to affect least Bell's vireo, yellow warbler, or their habitat because the breeding period is  
2 outside the period when floodplains would likely be inundated. Additionally, periodic inundation of  
3 floodplains would be expected to restore a more natural flood regime in support of riparian  
4 vegetation types that support least Bell's vireo and yellow warbler habitat. The overall effect of  
5 seasonal inundation in existing riparian natural communities would be beneficial, because,  
6 historically, flooding was the main natural disturbance regulating ecological processes in riparian  
7 areas, and flooding promotes the germination and establishment of many native riparian plants.

8 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres  
9 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,  
10 periodic inundation would not result in an adverse effect on least Bell's vireo or yellow warbler  
11 because inundation would occur primarily during the nonbreeding season and would promote a  
12 more natural flood regime in support of habitat for these species.

13 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85  
14 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.  
15 However, periodic inundation would have a less-than-significant impact on least Bell's vireo or  
16 yellow warbler because inundation would occur during the nonbreeding season. Flooding promotes  
17 the germination and establishment of many native riparian plants. Therefore, the overall impact of  
18 seasonal inundation in existing riparian natural communities would be beneficial for least Bell's  
19 vireo and yellow warbler.

#### 20 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

21 This section describes the effects of Alternative 1A on Suisun song sparrow and saltmarsh common  
22 yellowthroat. The habitat model used to assess effects for these species is based on primary  
23 breeding habitat and secondary habitat. Suisun song sparrow primary breeding habitat consists of  
24 all *Salicornia*-dominated tidal brackish emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-  
25 dominated tidal freshwater emergent wetland in the Plan Area west of Sherman Island, with the  
26 exception that *Scirpus acutus* and *S. californicus* plant communities (low marsh) and all of the plant  
27 communities listed below that occur in managed wetlands were classified as secondary habitat.  
28 Upland transitional zones, providing refugia during high tides, within 150 feet of the wetland edge  
29 were also included as secondary habitat. Secondary habitats generally provide only a few ecological  
30 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland  
31 transition zones), while primary habitats provide multiple functions, including breeding, effective  
32 predator cover, and valuable forage. Construction and restoration associated with Alternative 1A  
33 conservation measures would result in both temporary and permanent losses of Suisun song  
34 sparrow and saltmarsh common yellowthroat modeled habitat as indicated in Table 12-1A-34. The  
35 majority of the losses would take place over an extended period of time as tidal marsh is restored in  
36 the study area. Full implementation of Alternative 1A would also include the following conservation  
37 actions over the term of the BDCP to benefit the Suisun song sparrow (BDCP Chapter 3, Section 3.3,  
38 *Biological Goals and Objectives*).

- 39 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
40 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
41 with CM4).
- 42 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
43 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)



- Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective GNC1.4, associated with CM3)

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including *CM12 Methylmercury Management*) and implementation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell’s Vireo*, *Western Yellow-Billed Cuckoo*, and mitigation to minimize potential effects, impacts on Suisun song sparrow and saltmarsh common yellowthroat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1A-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>1,152</b>	<b>3,688</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>1,152</b>	<b>3,688</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

Alternative 1A conservation measures would result in the permanent loss of up to 3,688 acres of Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres of secondary habitat to middle or high marsh (Table 12-1A-34). The only conservation measure that would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 1       • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would  
2 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and  
3 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-4-34). In addition, 55 acres of  
4 primary habitat would be converted to secondary low marsh, and 123 acres of secondary  
5 habitat would be converted to middle or high marsh. Most areas proposed for removal would be  
6 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and  
7 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately  
8 2% of primary habitat for these species would be converted to foraging habitat. Full  
9 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent  
10 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow  
11 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland  
12 communities that are self-sustaining and not reliant on ongoing management actions necessary  
13 to maintain the existing managed wetland habitats would better ensure the long-term viability  
14 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and  
15 yellowthroat abundance and distribution would be monitored, and the restoration of tidal  
16 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats  
17 until functional habitats were restored (see BDCP Chapter 3, Section 3.4.5, *CM4 Tidal Natural*  
18 *Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring Program*).
- 19       • *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song  
20 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be  
21 expected to reduce predation loss of nests and, consequently, increase and maintain the  
22 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal  
23 habitats over the term of the BDCP. Habitat management- and enhancement-related activities  
24 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located  
25 near work sites. The potential for these activities to have an adverse effect on Suisun song  
26 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*  
27 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure  
28 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
29 would be available to address these effects on saltmarsh common yellowthroat. A variety of  
30 *CM11 Natural Communities Enhancement and Management* habitat management actions that are  
31 designed to enhance wildlife values in restored and protected tidal wetland habitats may result  
32 in localized ground disturbances that could temporarily remove small amounts of Suisun song  
33 sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,  
34 such as removal of nonnative vegetation and road and other infrastructure maintenance  
35 activities, are expected to have minor adverse effects on available species' habitat.
- 36       • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
37 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song  
38 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.  
39 Maintenance activities could include vegetation management, and levee repair. These effects,  
40 however, would be reduced by AMMs and conservation actions as described below.
- 41       • *Construction-related activities* could result in nest destruction or disturbance resulting in  
42 mortality of eggs and nestlings if restoration activities took place within the nesting period for  
43 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
44 *Yellow-Billed Cuckoo* would minimize these effects on Suisun song sparrow. Mitigation Measure  
45 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
46 would be available to address these effects on saltmarsh common yellowthroat. Grading, filling,

1           contouring, and other initial ground-disturbing operations during restoration activities could  
2 temporarily fragment existing modeled tidal brackish emergent wetland habitat for Suisun song  
3 sparrow and saltmarsh common yellowthroat which could temporarily reduce the extent and  
4 functions of the affected habitat. These temporary effects would be minimized through  
5 sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-Breasted*  
6 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

7           The following paragraphs summarize the combined effects discussed above and describe other  
8 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
9 included.

### 10           ***Near-Term Timeframe***

11           Under Alternative 1A, there would be no impacts resulting from the construction of the water  
12 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled  
13 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in  
14 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging  
15 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would  
16 provide primary nesting habitat for these species. Although there would be a temporal lag in these  
17 conversions, there would be no net loss of primary habitat in the near-term. These effects would  
18 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun  
19 Marsh in CZ 11.

20           The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
21 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in  
22 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
23 Using this ratio would indicate that 1,097 acres of tidal brackish emergent wetland should be  
24 restored/created to compensate for the near-term losses of Suisun song sparrow and saltmarsh  
25 common yellowthroat habitat.

26           The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent  
27 wetland and 4,800 acres of managed wetland in the Plan Area. These conservation actions are  
28 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early  
29 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and  
30 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11  
31 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh  
32 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter  
33 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and  
34 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the  
35 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh  
36 common yellowthroat through the enhancement of degraded areas to provide dense native  
37 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal  
38 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.  
39 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects  
40 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would  
41 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
42 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
43 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and  
44 protection contained in the near-term Plan goals, and the incorporation of the additional measures

1 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term  
2 effects of tidal restoration.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
8 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
9 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The  
10 AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The  
11 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
12 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
13 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for  
14 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests  
15 are detected and avoided. Mitigation Measure BIO-75 would be available to address the effect of  
16 construction activities on nesting saltmarsh common yellowthroat.

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

18 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
19 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
20 Alternative 1A as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the  
21 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
22 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary  
23 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

24 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
25 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
26 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
27 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
28 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
29 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
30 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to  
31 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
32 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
33 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
34 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
35 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
36 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
37 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
38 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
39 minimize any temporary, initial loss and fragmentation of habitat.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
41 and protection actions discussed above could result in the restoration of 1,500 acres of primary  
42 habitat and 4,500 acres of secondary habitat in addition to the protection of 384 acres of secondary  
43 habitat for Suisun song sparrow, which would also benefit the saltmarsh common yellowthroat.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM7 Barge Operations Plan, and AMM23 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
7 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
8 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
9 *Measures.*

10 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and  
11 potential direct mortality of these special-status species under Alternative 1A would represent an  
12 adverse effect in the absence of other conservation actions. However, with habitat protection and  
13 restoration associated with CM4, with the management and enhancement actions (CM11), and with  
14 the incorporation of the additional measures in the biological goals and objectives, and AMM1–  
15 AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
16 *Billed Cuckoo,* which would be in place throughout the construction period, the effects of habitat loss  
17 and potential mortality on Suisun song sparrow under Alternative 1A would not be adverse. The  
18 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
19 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
20 common yellowthroat, in order for the BDCP to avoid adverse effects on individuals, preconstruction  
21 surveys for noncovered avian species would be required to ensure that saltmarsh common  
22 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be available to  
23 address this effect.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Under Alternative 1A, there would be no impacts resulting from the construction of the water  
27 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled  
28 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in  
29 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging  
30 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would  
31 provide primary nesting habitat for these species. Although there would be a temporal lag in these  
32 conversions, there would be no net loss of primary habitat in the near-term. These effects would  
33 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun  
34 Marsh in CZ 11.

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
36 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in  
37 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
38 Using this ratio would indicate that 1,097 acres of tidal brackish emergent wetland should be  
39 restored/created to mitigate the near-term losses of Suisun song sparrow and saltmarsh common  
40 yellowthroat habitat.

41 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent  
42 wetland and 4,800 acres of managed wetland in the Plan Area. These conservation actions are  
43 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early  
44 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and

1 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11  
2 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh  
3 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter  
4 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and  
5 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the  
6 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh  
7 common yellowthroat through the enhancement of degraded areas to provide dense native  
8 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal  
9 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.  
10 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects  
11 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would  
12 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
13 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
14 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and  
15 protection contained in the near-term Plan goals, and the incorporation of the additional measures  
16 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term  
17 effects of tidal restoration.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
23 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
24 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The  
25 AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The  
26 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
27 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
28 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for  
29 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests  
30 are detected and avoided. Mitigation Measure BIO-75 would reduce the potential effect of  
31 construction activities on nesting saltmarsh common yellowthroat to less than significant.

32 Because the number of acres required to meet the typical mitigation ratio described above would be  
33 only 3,590 acres of restored/created tidal natural communities, the 6,000 acres of tidal brackish and  
34 tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland protection  
35 and enhancement contained in the near-term Plan goals, and the additional detail in the biological  
36 objectives for Suisun song sparrow, are more than sufficient to support the conclusion that the near-  
37 term impacts of habitat loss and direct mortality of Suisun song sparrow or saltmarsh common  
38 yellowthroat under Alternative 1A would be less than significant under CEQA.

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

40 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
41 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
42 Alternative 1A as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the  
43 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
44 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary  
45 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

1 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
2 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
3 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
4 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
5 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
6 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
7 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to  
8 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
9 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
10 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
11 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
12 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
13 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
14 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
15 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
16 minimize any temporary, initial loss and fragmentation of habitat.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
18 and protection actions discussed above could result in the restoration of 1,500 acres of primary  
19 habitat and 4,500 acres of secondary habitat in addition to the protection of 384 acres of secondary  
20 habitat for Suisun song sparrow, which would also benefit the saltmarsh common yellowthroat.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
26 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
27 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
28 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
29 *Measures*. The saltmarsh common yellowthroat is not a covered species under the BDCP. Although  
30 preconstruction surveys for Suisun song sparrow may detect nesting saltmarsh common  
31 yellowthroat, for the BDCP to have a less-than-significant impact on individuals, preconstruction  
32 surveys for noncovered avian species would be required to ensure that saltmarsh common  
33 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would reduce this potential  
34 impact on nesting saltmarsh common yellowthroat to a less-than-significant level.

35 Considering these restoration provisions, which would replace low-value secondary habitat with  
36 high-value tidal brackish emergent habitat, including both foraging and primary habitat, and provide  
37 upland refugia for Suisun song sparrow and saltmarsh common yellowthroat, the acreages of  
38 restoration would be sufficient to compensate for habitats lost to construction and restoration  
39 activities. Loss of habitat or direct mortality through implementation of Alternative 1A, with the  
40 implementation of AMM1-AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct Preconstruction*  
41 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not result in a substantial adverse  
42 effect through habitat modifications and would not substantially reduce the number or restrict the  
43 range of the species. Therefore, the loss of habitat or potential mortality under this alternative  
44 would have a less-than-significant impact on Suisun song sparrow and saltmarsh common  
45 yellowthroat.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**  
5           **Saltmarsh Common Yellowthroat**

6           **Indirect construction-related effects:** If Suisun song sparrow or saltmarsh common yellowthroat  
7           were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise  
8           and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
9           functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common  
10          yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,  
11          which could temporarily result in diminished use of habitat. Construction noise above background  
12          noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
13          activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
14          *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
15          the extent to which these noise levels could affect either species. If construction occurred during the  
16          nesting season, these indirect effects could result in the loss or abandonment of nests and mortality  
17          of any eggs and/or nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*  
18          *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
19          *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of  
20          construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh  
21          common yellowthroat by requiring preconstruction surveys and, if nests are present, the  
22          establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical  
23          equipment during water conveyance facilities construction could cause the accidental release of  
24          petroleum or other contaminants that could affect species in the surrounding habitat. The  
25          inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
26          adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. *AMM2 Construction*  
27          *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure  
28          that measures are in place to prevent runoff from the construction area and any adverse effects of  
29          dust on active nests.

30          **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun  
31          Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal  
32          habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase  
33          as a result of water conveyance facilities operations and operations of salinity control gates to mimic  
34          a more natural water flow. This would likely encourage the establishment of tidal wetland plant  
35          communities tolerant of more saline environments, which should have a beneficial effect on Suisun  
36          song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh  
37          habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels  
38          and sloughs in and around Suisun Marsh would be highly variable.

39          **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
40          to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
41          methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
42          tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
43          newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
44          *Strategy*, for details of restoration). Although tidal habitat restoration might increase methylation of



1 mercury export to other habitats, restoration is unlikely to significantly increase the exposure of  
2 methylmercury to Suisun song sparrow or saltmarsh common yellowthroat, as they currently reside  
3 in tidal marshes where elevated methylmercury levels exist. Robinson et al. (2011) found toxic  
4 levels of methylmercury levels in song sparrow populations from southern San Francisco Bay,  
5 although populations near Suisun Marsh (i.e., San Pablo and Simas Creeks) were much lower. The  
6 potential mobilization or creation of methylmercury within the study area varies with site-specific  
7 conditions and would need to be assessed at the project level. The Suisun Marsh Plan anticipates  
8 that restored tidal wetlands would generate less methylmercury than the existing managed  
9 wetlands to be restored (Bureau of Reclamation et al. 2010). *CM12 Methylmercury Management*  
10 includes provisions for project-specific Mercury Management Plans. Along with minimization and  
11 mitigation measures and adaptive management and monitoring, CM12 would be available to  
12 address the uncertainty of methylmercury levels resulting from restored tidal marsh in the study  
13 area.

14 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song  
15 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
16 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
17 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address potential effects  
18 of noise and visual disturbance on saltmarsh common yellowthroat. AMM1–AMM7, including *AMM2*  
19 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and  
20 ensure that measures were in place to prevent runoff from the construction area and to avoid  
21 negative effects of dust on the species. Implementation of Operational Scenario A, including  
22 operation of salinity-control gates, and tidal habitat restoration would be expected to increase water  
23 salinity in Suisun Marsh, which would be expected to establish tidal marsh similar to historic  
24 conditions. Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow  
25 and saltmarsh common yellowthroat through increased exposure to methylmercury, as these  
26 species currently reside in tidal marshes where elevated methylmercury levels exist. However, it is  
27 unknown what concentrations of methylmercury are harmful to the species and the potential for  
28 increased exposure varies substantially within the study area. Site-specific restoration plans in  
29 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
30 would address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific  
31 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
32 of methylmercury exposure for these species, once site specific sampling and other information  
33 could be developed.

34 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
35 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
36 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
37 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*, Mitigation Measure BIO-75, *Conduct Preconstruction*  
38 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and *AMM2 Construction Best*  
39 *Management Practices and Monitoring*. Changes in salinity gradients would be expected to have a  
40 beneficial impact on Suisun song sparrow and saltmarsh common yellowthroat through the  
41 establishment of tidal marsh similar to historic conditions. The implementation of tidal natural  
42 communities restoration (CM4) is unlikely to significantly increase the exposure of methylmercury  
43 to Suisun song sparrow or saltmarsh common yellowthroat, as they currently reside in tidal  
44 marshes where elevated methylmercury levels exist. However, it is unknown what concentrations of  
45 methylmercury are harmful to these species. Sites-specific restoration plans that address the  
46 creation and mobilization of mercury, as well as monitoring and adaptive management as described

1 in *CM12 Methylmercury Management*, would better inform potential impacts and address the  
2 uncertainty of methylmercury levels in restored tidal marsh in the study area. With these additional  
3 avoidance and minimization measures, Mitigation Measure BIO-75, and *CM12 Methylmercury*  
4 *Management*, indirect effects of Plan implementation would have a less-than-significant impact on  
5 Suisun song sparrow and saltmarsh common yellowthroat.

6 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
7 **Disturbance of Nesting Birds**

8 See Mitigation Measure BIO-75 under Impact BIO-75.

9 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**  
10 **Associated with Electrical Transmission Facilities**

11 The range of the Suisun song sparrow extends eastward into the Plan Area to approximately Kimball  
12 Island. There are several reported occurrences from Kimball Island, Browns Island, and in the  
13 Suisun Marsh in the western portion of the Plan Area. The easternmost range of the saltmarsh  
14 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable  
15 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment 5J.C,  
16 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current  
17 populations, species ranges, and suitable habitat in the plan area make collision with the proposed  
18 transmission lines highly unlikely. Therefore the construction and presence of new transmission  
19 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common  
20 yellowthroat.

21 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
22 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the  
23 current populations, species ranges, and suitable habitat for the species make collision with the  
24 proposed transmission lines highly unlikely.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
26 significant impact on Suisun song sparrow and saltmarsh common yellowthroat because the  
27 location of the current populations, species ranges, and suitable habitat for the species make  
28 collision with the proposed transmission lines highly unlikely.

29 **Swainson's Hawk**

30 This section describes the effects of Alternative 1A, including water conveyance facilities  
31 construction and implementation of other conservation components, on Swainson's hawk. The  
32 habitat model used to assess impacts on Swainson's hawk includes plant alliances and land cover  
33 types associated with Swainson's hawk nesting and foraging habitat. Construction and restoration  
34 associated with Alternative 1A conservation measures would result in both temporary and  
35 permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-1A-35. The majority  
36 of the losses would take place over an extended period of time as tidal marsh is restored in the study  
37 area. Although protection and restoration for the loss of nesting and foraging habitat would be  
38 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)  
39 for restored habitats to replace the functions of habitat lost. This time lag between impacts and  
40 restoration of habitat function would be minimized through specific requirements of *AMM18*  
41 *Swainson's Hawk and White-Tailed Kite*, including transplanting mature trees in the near-term time  
42 period. Full implementation of Alternative 1A would also include the following conservation actions

1 over the term of the BDCP to benefit the Swainson's hawk (BDCP Chapter 3, Section 3.3, *Biological*  
2 *Goals and Objectives*).

- 3 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
4 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
5 associated with CM7)
- 6 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
7 10 (Objective VFRNC1.2, associated with CM3).
- 8 • Plant and maintain native trees along roadsides and field borders within protected cultivated  
9 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 10 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
11 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3).
- 12 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
13 VPNC2.5, and GNC2.4, associated with CM11).
- 14 • Conserve at least 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging  
15 habitat (Objective SH1.1, associated with CM3).
- 16 • Protect at least 42,275 acres of cultivated lands as Swainson's hawk foraging habitat with at  
17 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated  
18 with CM3).
- 19 • Of the at least 42,275 acres of cultivated lands protected as Swainson's hawk foraging habitat  
20 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface  
21 elevations greater than -1 foot NAVD88 (Objective SH1.3, associated with CM3).
- 22 • Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson's  
23 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 24 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
25 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 26 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
27 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
28 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
29 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

30 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
31 management activities that would enhance these natural communities for the species and  
32 implementation of AMM1-AMM7, and *AMM18 Swainson's Hawk and White-Tailed Kite*, impacts on  
33 Swainson's hawk would not be adverse for NEPA purposes and would be less than significant for  
34 CEQA purposes.

1 **Table 12-1A-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 1A**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	18	18	16	16	NA	NA
	Foraging	3,295	3,295	1,429	1,429	NA	NA
<b>Total Impacts CM1</b>		<b>3,313</b>	<b>3,313</b>	<b>1,445</b>	<b>1,445</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	252	412	54	85	41-70	189
	Foraging	8,903	48,511	504	1,540	3,025-6,635	8,008
<b>Total Impacts CM2-CM18</b>		<b>9,155</b>	<b>48,923</b>	<b>558</b>	<b>1,625</b>	<b>3,066-6,705</b>	<b>8,197</b>
<b>Total Nesting</b>		<b>270</b>	<b>430</b>	<b>70</b>	<b>101</b>	41-70	189
<b>Total Foraging</b>		<b>12,198</b>	<b>51,806</b>	<b>1,949</b>	<b>2,985</b>	3,025-6,635	8,008
<b>TOTAL IMPACTS</b>		<b>12,468</b>	<b>52,236</b>	<b>2,019</b>	<b>3,070</b>	<b>3,066-6,705</b>	<b>8,197</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
6 of up to 55,322 acres of modeled habitat (531 acres of nesting habitat and 54,791 acres of foraging  
7 habitat) for Swainson’s hawk (Table 12-1A-35). Conservation measures that would result in these  
8 losses are conveyance facilities and transmission line construction, and establishment and use of  
9 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
10 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),  
11 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
12 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
13 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
14 In addition, maintenance activities associated with the long-term operation of the water conveyance  
15 facilities and other BDCP physical facilities could affect Swainson’s hawk modeled habitat. Each of  
16 these individual activities is described below. A summary statement of the combined impacts and  
17 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Conveyance Facilities and Operation:* Construction of Alternative 1A water  
19 conveyance facilities would result in the combined permanent and temporary loss of up to 34  
20 acres of Swainson’s hawk nesting habitat (18 acres of permanent loss and 16 acres of temporary  
21 loss). In addition, 4,740 acres of foraging habitat would be removed (3,295 acres of permanent

1 loss, 1,445 acres of temporary loss). Activities that would impact modeled Swainson’s hawk  
 2 habitat consist of tunnel, forebay, and intake construction, temporary access roads, and  
 3 construction of transmission lines. Most of the permanent loss would occur where Intakes 1–5  
 4 impact the Sacramento River’s east bank between Freeport and Courtland. The riparian areas  
 5 here are very small patches, some dominated by valley oak and others by nonnative trees.  
 6 Temporary losses would occur where pipelines cross Snodgrass Slough and other small  
 7 waterways east of the Sacramento River, and where temporary work areas surround intake  
 8 sites. The riparian habitat in these areas is also composed of very small patches or stringers  
 9 bordering waterways, which are composed of valley oak and scrub vegetation. There are at least  
 10 17 occurrences of nesting Swainson’s hawk that overlap with the construction footprint of CM1,  
 11 primarily from the construction footprint of the permanent and temporary transmission lines,  
 12 intake 5 and other intake work areas. The implementation of *AMM18 Swainson’s Hawk and*  
 13 *White-Tailed Kite*, would require preconstruction surveys and the establishment of no-  
 14 disturbance buffers and would minimize potential effects on nesting Swainson’s hawks present  
 15 within or adjacent to construction areas. Permanent foraging habitat impacts from CM1 would  
 16 include 914 acres of high-value foraging habitat (alfalfa; Table 12-1A-36). Impacts from CM1  
 17 would occur in the central Delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. Refer to the Terrestrial  
 18 Biology Map Book for a detailed view of Alternative 1A construction locations. Impacts from  
 19 CM1 would occur within the first 10 years of Plan implementation.

20 **Table 12-1A-36. Acres of Impacted Swainson’s Hawk Foraging Habitat by Value Classes**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2–CM18 Permanent (temporary)
Very high	Alfalfa hay	914 (131)	12,002 (345)
Moderate	Irrigated pasture, other hay crops	856 (847)	24,865 (642)
Low	Other irrigated field and truck/berry crops	339 (39)	5,911 (313)
Very low	Safflower, sunflower, corn, grain sorghum	1,186 (413)	5,732 (241)

- 21
- 22 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
 23 would result in the combined permanent and temporary loss of up to 133 acres of nesting  
 24 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
 25 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554  
 26 acres of temporary loss). Activities through CM2 could involve excavation and grading in  
 27 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
 28 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
 29 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
 30 Sacramento Weir would also remove Swainson’s hawk habitat. The loss is expected to occur  
 31 during the first 10 years of Alternative 1A implementation.
  - 32 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
 33 inundation would permanently remove an estimated 295 acres of Swainson’s hawk nesting  
 34 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of  
 35 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
 36 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
 37 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
 38 directly impact and fragment grassland just north of Rio Vista in and around French and

1 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
2 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
3 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of  
4 10,757 acres of very high-value (alfalfa), 18,565 acres of moderate-value, and 4,098 acres of  
5 low-value habitat (See Table 12-4-36 for land cover types classified by habitat value). Because  
6 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce  
7 the use of remaining cultivated lands or preclude access to surrounding lands. However, the  
8 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal  
9 restoration footprints could result in the removal or abandonment of nesting territories that  
10 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree  
11 mortality would be expected over time as areas became tidally inundated. Depending on the  
12 extent and value of remaining habitat, this could reduce the local nesting population. There are  
13 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for  
14 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal  
15 restoration activities.

- 16 • *CM5 Seasonally Inundated Floodplain Restoration* Construction of setback levees to restore  
17 seasonally inundated floodplain and riparian restoration actions would remove approximately  
18 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary  
19 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of  
20 temporary loss). These losses would be expected after the first 10 years of Alternative 1A  
21 implementation along the San Joaquin River and other major waterways in CZ 7.
- 22 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
23 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and  
24 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27  
25 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 26 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
27 implemented on agricultural lands and would result in the conversion of 1,849 acres of  
28 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,  
29 and 11. If agricultural lands supporting higher value foraging habitat than the restored  
30 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 31 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
32 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and  
33 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may  
34 develop along the margins of restored nontidal marsh if appropriate site conditions are present.
- 35 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
36 enhancement-related activities could disturb Swainson's hawk nests if they were present near  
37 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
38 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
39 remove small amounts of Swainson's hawk habitat and reduce the functions of habitat until  
40 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation  
41 and road and other infrastructure maintenance, are expected to have minor effects on available  
42 Swainson's hawk habitat and are expected to result in overall improvements to and  
43 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but  
44 are expected to be minimal and would be avoided and minimized by the AMMs listed below.  
45 CM11 would also include the construction of recreational-related facilities including trails,

1 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*  
2 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
3 etc. would be placed on existing, disturbed areas when and where possible. However,  
4 approximately 50 acres of Swainson's hawk grassland foraging habitat would be lost from the  
5 construction of trails and facilities.

- 6 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
7 Swainson's hawk foraging habitat for the development of a delta and longfin smelt conservation  
8 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

9 Permanent and temporary nesting habitat losses from the above conservation measures, would  
10 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat  
11 would be restored as riparian habitat within 1 year following completion of construction  
12 activities. The restored riparian habitat would require 1 to several decades to functionally  
13 replace habitat that has been affected and for trees to attain sufficient size and structure suitable  
14 for nesting by Swainson's hawks. *AMM18 Swainson's Hawk and White-Tailed Kite* contains  
15 actions described below to reduce the effect of temporal loss of nesting habitat, including the  
16 transplanting of mature trees and planting of trees near high-value foraging habitat. The  
17 functions of cultivated lands and grassland communities that provide foraging habitat for  
18 Swainson's hawk would be restored relatively quickly.

- 19 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
20 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
21 disturbances that could affect Swainson's hawk use of the surrounding habitat. Maintenance  
22 activities would include vegetation management, levee and structure repair, and re-grading of  
23 roads and permanent work areas. These effects, however, would be reduced by AMM1-AMM7  
24 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
25 described below.

- 26 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
27 direct mortality of adult or fledged Swainson's hawk if they were present in the Plan Area,  
28 because they would be expected to avoid contact with construction and other equipment.  
29 However, if Swainson's hawk were to nest in the construction area, construction-related  
30 activities, including equipment operation, noise and visual disturbances could affect nests or  
31 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
32 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
33 *Tailed Kite* into the BDCP.

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

### 37 ***Near-Term Timeframe***

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
40 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
41 the effect of construction would not be adverse under NEPA. The Plan would remove 340 acres (270  
42 permanent, 70 temporary) of Swainson's hawk nesting habitat in the study area in the near-term.  
43 These effects would result from the construction of the water conveyance facilities (CM1, 34 acres),  
44 and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal*

1 *Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7*  
2 *Riparian Natural Community Restoration—306 acres). In addition, 14,147 acres of Swainson’s hawk*  
3 *foraging habitat would be removed or converted in the near-term (CM1, 4,740 acres; CM2 Yolo*  
4 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5, Seasonally*  
5 *Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland*  
6 *Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,*  
7 *CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—*  
8 *9,407 acres).*

9 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
10 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3 of  
11 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
12 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 34  
13 acres of nesting habitat should be restored/ created and 34 acres should be protected to  
14 compensate for the CM1 losses of Swainson’s hawk nesting habitat. In addition, 4,740 acres of  
15 foraging habitat should be protected to mitigate the CM1 losses of Swainson’s hawk foraging habitat.  
16 The near-term effects of other conservation actions would remove 306 acres of modeled nesting  
17 habitat, and therefore require 306 acres of restoration and 306 acres of protection of nesting  
18 habitat. Similarly, the near-term effects of other conservation actions would remove 9,407 acres of  
19 modeled foraging habitat, and therefore require 9,407 acres of protection of foraging habitat using  
20 the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting  
21 habitat; 1:1 protection for the loss of foraging habitat).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
23 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
24 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
25 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
26 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These  
27 conservation actions are associated with CM3, CM5, CM7, and CM8, and would occur in the same  
28 timeframe as the construction and early restoration losses.

29 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
30 system with extensive wide bands or large patches of valley/foothill riparian natural community  
31 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
32 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
33 for the species. The distribution and abundance of potential Swainson’s hawk nest trees would be  
34 increased by planting and maintaining native trees along roadsides and field borders within  
35 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
36 but essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be  
37 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
38 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

39 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
40 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
41 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
42 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
43 would provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of  
44 habitat fragmentation. Small mammal populations would also be increased on protected lands,  
45 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and



1 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through  
2 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within  
3 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other  
4 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve  
5 system which would provide additional foraging habitat and a source of rodent prey that could  
6 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including  
7 upland grassland components) that dry during the spring would also serve as foraging habitat for  
8 Swainson's hawks as prey species recolonize the fields (Objective MWNC1.1). These biological goals  
9 and objectives would inform the near-term protection and restoration efforts and represent  
10 performance standards for considering the effectiveness of restoration actions. At least 15,400 acres  
11 of cultivated lands that provide habitat for covered and other native wildlife species would be  
12 protected in the near-term time period (Objective CLNC1.1). A minimum of 87% of cultivated lands  
13 protected by the late long-term time period would be in very high- and high-value crop types for  
14 Swainson's hawk (Objective SH1.2). This biological objective provides an estimate for the  
15 proportion of cultivated lands protected in the near-term time period which would provide high-  
16 value habitat for Swainson's hawk. The acres of restoration and protection contained in the near-  
17 term Plan goals and the additional detail in the biological objectives satisfy the typical mitigation  
18 that would be applied to the project-level effects of CM1 on Swainson's hawk foraging habitat, as  
19 well as mitigate the near-term effects of the other conservation measures.

20 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
21 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
22 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
23 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
24 require one to several decades to functionally replace habitat that has been affected and for trees to  
25 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
26 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
27 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
28 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
29 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
30 would further reduce this limited resource and could reduce or restrict the number of active  
31 Swainson's hawk nests within the Plan Area until restored riparian habitat is sufficiently developed.

32 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
33 trees, including transplanting trees scheduled for removal. These would be supplemented with  
34 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
35 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
36 In addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve  
37 system for every tree anticipated to be removed by construction during the near-term period that  
38 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
39 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
40 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
41 in clumps of at least 3 trees each at appropriate sites within or adjacent to conserved cultivated  
42 lands, or they could be incorporated as a component of the riparian restoration (CM5, CM7) where  
43 they are in close proximity to suitable foraging habitat. Replacement trees that were incorporated  
44 into the riparian restoration would not be clustered in a single region of the study area, but would  
45 be distributed throughout the lands protected as foraging habitat for Swainson's hawk.

1 To enhance Swainson's hawk and reproductive output until the replacement nest trees become  
2 suitable for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected  
3 in the near-term for each potential nest site removed (a nest site is defined as a 125-acre block in  
4 which more than 50% of nest trees are 20 feet or greater in height) as a result of construction  
5 activity during the near-term. The foraging habitat to be protected would be within 6 kilometers of  
6 the removed tree within an otherwise suitable foraging landscape and on land not subject to threat  
7 of seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
8 value of the land. With this program in place, Alternative 1A would not have a substantial adverse  
9 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
10 habitat modifications.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
16 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
17 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 18 **Late Long-Term Timeframe**

19 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
20 modeled foraging habitat for Swainson's hawk. Alternative 1A as a whole would result in the  
21 permanent loss of and temporary effects on 531 acres of potential nesting habitat (5% of the  
22 potential nesting habitat in the study area) and 54,791 acres of foraging habitat (12% of the foraging  
23 habitat in the study area).

24 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
25 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Communities*  
26 *Restoration*, and *CM8 Grassland Natural Communities Restoration*, to restore or create at least 5,000  
27 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
28 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
29 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed  
30 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
31 species (Table 3-4 in Chapter 3).

32 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
33 system with extensive wide bands or large patches of valley/foothill riparian natural community  
34 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
35 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
36 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
37 increased by planting and maintaining native trees along roadsides and field borders within  
38 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
39 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
40 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
41 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

42 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
43 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
44 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a

1 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
2 would provide foraging habitat for Swainson's hawk and reduce the effects of current levels of  
3 habitat fragmentation. Small mammal populations would also be increased on protected lands,  
4 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
5 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through  
6 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within  
7 protected cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated  
8 areas would also be protected and maintained as part of the cultivated lands reserve system which  
9 would provide additional foraging habitat and a source of rodent prey that could recolonize  
10 cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including upland  
11 grassland components) that dry during the spring would also serve as foraging habitat for  
12 Swainson's hawks as prey species recolonize the fields (Objective MWNC1.1). These biological goals  
13 and objectives would inform the near-term protection and restoration efforts and represent  
14 performance standards for considering the effectiveness of restoration actions. Foraging habitat  
15 would be conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands  
16 that provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of  
17 which would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

25 **NEPA Effects:** The loss of Swainson's hawk habitat and potential for direct mortality of this special-  
26 status species under Alternative 1A would represent an adverse effect in the absence of other  
27 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
28 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM18*  
29 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
30 the effects of habitat loss and potential mortality on Swainson's hawk under Alternative 1A would  
31 not be adverse under NEPA.

### 32 **CEQA Conclusion:**

#### 33 **Near-Term Timeframe**

34 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
35 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
36 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
37 the effect of construction would be less than significant under CEQA. The Plan would remove 340  
38 acres (270 permanent, 70 temporary) of Swainson's hawk nesting habitat in the study area in the  
39 near-term. These effects would result from the construction of the water conveyance facilities (CM1,  
40 34 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
41 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and  
42 *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 14,147 acres of Swainson's  
43 hawk foraging habitat would be removed or converted in the near-term (CM1, 4,740 acres; *CM2 Yolo*  
44 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally*  
45 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*

1 *Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,*  
2 *CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—*  
3 *9,407 acres).*

4 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
5 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of  
6 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
7 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 34  
8 acres of nesting habitat should be restored/ created and 34 acres should be protected to mitigate  
9 the CM1 losses of Swainson's hawk nesting habitat. In addition, 4,740 acres of foraging habitat  
10 should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat. The near-term  
11 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and  
12 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,  
13 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging  
14 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical  
15 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1  
16 protection for the loss of foraging habitat).

17 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
18 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
19 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
20 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
21 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These  
22 conservation actions are associated with CM3, CM5, CM7, and CM8, and would occur in the same  
23 timeframe as the construction and early restoration losses.

24 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
25 system with extensive wide bands or large patches of valley/foothill riparian natural community  
26 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
27 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
28 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
29 increased by planting and maintaining native trees along roadsides and field borders within  
30 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
31 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
32 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
33 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

34 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
35 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
36 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
37 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
38 would provide foraging habitat for Swainson's hawk and reduce the effects of current levels of  
39 habitat fragmentation. Small mammal populations would also be increased on protected lands,  
40 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
41 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through  
42 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within  
43 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other  
44 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve  
45 system which would provide additional foraging habitat and a source of rodent prey that could

1 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including  
2 upland grassland components) that dry during the spring would also serve as foraging habitat for  
3 Swainson's hawks as prey species recolonize the fields (Objective MWNC1.1). These biological goals  
4 and objectives would inform the near-term protection and restoration efforts and represent  
5 performance standards for considering the effectiveness of restoration actions. At least 15,400 acres  
6 of cultivated lands that provide habitat for covered and other native wildlife species would be  
7 protected in the near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands  
8 protected by the late long-term time period would be in very high- and high-value crop types for  
9 Swainson's hawk (Objective SH1.2). This biological objective provides an estimate for the  
10 proportion of cultivated lands protected in the near-term time period which would provide high-  
11 value habitat for Swainson's hawk. The acres of restoration and protection contained in the near-  
12 term Plan goals and the additional detail in the biological objectives satisfy the typical mitigation  
13 that would be applied to the project-level effects of CM1 on Swainson's hawk foraging habitat, as  
14 well as mitigate the near-term effects of the other conservation measures.

15 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
16 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
17 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
18 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
19 require one to several decades to functionally replace habitat that has been affected and for trees to  
20 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
21 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
22 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
23 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
24 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
25 would further reduce this limited resource and could reduce or restrict the number of active  
26 Swainson's hawk within the Plan Area until restored riparian habitat is sufficiently developed.

27 *AMM18 Swainson's hawk and White-Tailed Kite* would implement a program to plant large mature  
28 trees, including transplanting trees scheduled for removal. These would be supplemented with  
29 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
30 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
31 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
32 system for every tree anticipated to be removed by construction during the near-term period that  
33 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
34 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
35 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
36 in clumps of at least three trees each at appropriate sites within or adjacent to conserved cultivated  
37 lands, or they may be incorporated as a component of the riparian restoration (CM5, CM7) where  
38 they are in close proximity to suitable foraging habitat. Replacement trees that are incorporated into  
39 the riparian restoration would not be clustered in a single region of the Plan Area, but would be  
40 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

41 To enhance Swainson's hawk reproductive output until the replacement nest trees become suitable  
42 for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected in the  
43 near-term for each potential nest site removed (a nest site is defined as a 125-acre block in which  
44 more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity  
45 during the near-term. The foraging habitat to be protected would be within 6 kilometers of the  
46 removed tree within an otherwise suitable foraging landscape and on land not subject to threat of

1 seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
2 value of the land. With this program in place, Alternative 1A would not have a substantial adverse  
3 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
4 habitat modifications.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
10 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
11 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 12 **Late Long-Term Timeframe**

13 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
14 modeled foraging habitat for Swainson's hawk. Alternative 1A as a whole would result in the  
15 permanent loss of and temporary effects on 531 acres of potential nesting habitat (5% of the  
16 potential nesting habitat in the study area) and 54,791 acres of foraging habitat (12% of the foraging  
17 habitat in the study area).

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
19 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
20 *Restoration*, and *CM8 Grassland Natural Communities Restoration* to restore or create at least 5,000  
21 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
22 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
23 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed  
24 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
25 species (Table 3-4 in Chapter 3).

26 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
27 system with extensive wide bands or large patches of valley/foothill riparian natural community  
28 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
29 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
30 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
31 increased by planting and maintaining native trees along roadsides and field borders within  
32 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
33 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
34 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
35 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

36 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
37 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
38 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
39 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
40 would provide foraging habitat for Swainson's hawk and reduce the effects of current levels of  
41 habitat fragmentation. Small mammal populations would also be increased on protected lands,  
42 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
43 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through  
44 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within

1 protected cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated  
2 areas would also be protected and maintained as part of the cultivated lands reserve system which  
3 would provide additional foraging habitat and a source of rodent prey that could recolonize  
4 cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including upland  
5 grassland components) that dry during the spring would also serve as foraging habitat for  
6 Swainson's hawks as prey species recolonize the fields (Objective MWNC1.1). These biological goals  
7 and objectives would inform the near-term protection and restoration efforts and represent  
8 performance standards for considering the effectiveness of restoration actions. Foraging habitat  
9 would be conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands  
10 that provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of  
11 which would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
16 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
17 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
18 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

19 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
20 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
21 restoring riparian and foraging habitats lost to construction and restoration activities, and  
22 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
23 habitat or direct mortality through implementation of Alternative 1A would not result in a  
24 substantial adverse effect through habitat modifications and would not substantially reduce the  
25 number or restrict the range of the species. Therefore, the loss of habitat or potential mortality  
26 under this alternative would have a less-than-significant impact on Swainson's hawk.

#### 27 **Impact BIO-84: Effects on Swainson's Hawk Associated with Electrical Transmission Facilities**

28 New transmission lines would increase the risk that Swainson's hawks could be subject to power  
29 line strikes, which could result in injury or mortality of Swainson's hawks. This species would be at  
30 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis  
31 (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).  
32 Factors analyzed include the height of the new transmission lines and the flight behavior of the  
33 species. The existing network of transmission lines in the Plan Area currently poses the same small  
34 risk for Swainson's hawk, and any incremental risk associated with the new power line corridors  
35 would also be expected to be low. *AMM20 Greater Sandhill Crane*, would further reduce any potential  
36 effects.

37 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson's hawk power  
38 line strikes. With the implementation of *AMM20 Greater Sandhill Crane* the potential effect of the  
39 construction of new transmission lines on Swainson's hawk would not be adverse.

40 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson's hawk  
41 power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential impact of the  
42 construction of new transmission lines on Swainson's hawk to a less-than-significant level.

1 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson's Hawk**

2 Noise and visual disturbances from the construction of water conveyance facilities and other  
3 conservation measures could reduce Swainson's hawk use of modeled habitat adjacent to work  
4 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900  
5 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
6 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
7 are no available data to determine the extent to which these noise levels could affect Swainson's  
8 hawk. Moreover, operation and maintenance of the water conveyance facilities, including the  
9 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
10 affect Swainson's hawk use of the surrounding habitat. These construction activities would include  
11 water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont  
12 Weir/Yolo Bypass Enhancements. Swainson's hawks are seasonally abundant across much of the  
13 study area wherever adequate nest trees occur within a cultivated landscape that supports suitable  
14 foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP  
15 actions to temporarily displace Swainson's hawks and temporarily reduce the use of suitable habitat  
16 adjacent to construction areas. These adverse effects would be minimized with the implementation  
17 of *AMM18 Swainson's Hawk and White-Tailed Kite*.

18 The use of mechanical equipment during water conveyance facilities construction could cause the  
19 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in  
20 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
21 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*  
22 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that  
23 measures are in place to prevent runoff from the construction area and negative effects of dust on  
24 habitat.

25 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
26 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation  
27 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
28 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the  
29 surrounding habitat. The effects of noise, the potential for hazardous spills, increased dust and  
30 sedimentation, and operations and maintenance of the water conveyance facilities would not have  
31 an adverse effect on Swainson's hawk with the implementation of *AMM1-AMM7*, and *AMM18*  
32 *Swainson's Hawk and White-Tailed Kite*.

33 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
34 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,  
35 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
36 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's  
37 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,  
38 increased dust and sedimentation, and operations and maintenance of the water conveyance  
39 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation  
40 of *AMM1-AMM7*, and *AMM18 Swainson's Hawk and White-Tailed Kite*.

41 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging**  
42 **Habitat as a Result of Implementation of Conservation Components**

43 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
44 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-



1 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41–70 acres of  
2 nesting habitat and 3,025–6,635 acres of foraging habitat; Table 12-1A-34). However, project-  
3 associated inundation of areas that would not otherwise have been inundated would be expected to  
4 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining  
5 estimated 70% of all years, and during those years notch operations would not typically affect the  
6 maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
7 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat  
8 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass  
9 operations. However, increased duration of inundation during years of Fremont Weir operation,  
10 may delay the period for which foraging habitat is available to Swainson's hawks by up to several  
11 weeks.

12 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
13 *Restoration*, could result in the periodic inundation of up to approximately 8,197 acres of modeled  
14 Swainson's hawk habitat (Table 12-1A-35), consisting of 189 acres of nesting and 8,008 acres of  
15 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime  
16 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.  
17 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)  
18 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated  
19 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of  
20 available foraging habitat due to the reduction in available prey. Inundated habitats would be  
21 expected to recover following draw-down and provide suitable foraging conditions until the  
22 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely  
23 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

24 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
25 sites because trees in which nest sites are situated already withstand floods, the increase in  
26 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
27 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
28 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.  
29 This would be considered a short-term effect that would not result in an adverse effect on  
30 Swainson's hawk.

31 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
32 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
33 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
34 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
35 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.  
36 This would be considered a short-term effect that would not have a significant impact on Swainson's  
37 hawk.

### 38 **Tricolored Blackbird**

39 This section describes the effects of Alternative 1A, including water conveyance facilities  
40 construction and implementation of other conservation components, on tricolored blackbird. The  
41 habitat model used to assess effects for tricolored blackbird is based on breeding habitat and  
42 nonbreeding habitat. Although nesting colonies have been documented along the fringe of Suisun  
43 Marsh, in the Yolo Bypass and along the southwestern perimeter of the Plan Area, breeding colonies  
44 are uncommon in the Plan Area. Modeled breeding habitat includes bulrush/cattail wetlands and

1 shrub communities that may provide suitable nesting substrate, and adjacent high-value foraging  
2 areas that occur within 5 miles of nesting colonies documented in the Plan Area. The foraging  
3 component includes cultivated lands and noncultivated land cover types known to support  
4 abundant insect populations such as grasslands, pasturelands (including alfalfa), natural seasonal  
5 wetlands, and sunflower croplands. The Delta is recognized as a major wintering area for tricolored  
6 blackbird (Hamilton 2004, Beedy 2008). Modeled nonbreeding habitat includes emergent wetlands  
7 and shrub stands that provide suitable roosting habitat, as well as cultivated lands and  
8 noncultivated lands that provide foods sought by tricolored blackbirds during the winter. Outside of  
9 the breeding season, tricolored blackbirds are primarily granivores that forage opportunistically  
10 across the Plan Area in grasslands, pasturelands, croplands, dairies, and livestock feed lots. Factors  
11 considered in assessing the value of affected habitat for the tricolored blackbird, include patch size,  
12 suitability of vegetation, and proximity to recorded occurrences.

13 Construction and restoration associated with Alternative 1A conservation measures would result in  
14 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table  
15 12-1A-37. Full implementation of Alternative 1A would also include the following conservation  
16 actions over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3,  
17 *Biological Goals and Objectives*).

- 18 ● Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)  
19 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs  
20 1, 2, 8, or 11. (TRBL1.1).
- 21 ● Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as  
22 nonbreeding foraging habitat, 50% of which is of high or very high value (TRBL1.2).
- 23 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles  
24 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat  
25 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of which will be within 5 miles of the at least 50  
26 acres of nesting habitat protected under Objective TRBL1.1 (Objective TRBL1.3).
- 27 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
28 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
29 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
30 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 31 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
32 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
33 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 34 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 35 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
36 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 37 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
38 VPNC2.5, and GNC2.4, associated with CM11).

39 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
40 management activities that would enhance these natural communities for the species and  
41 implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*, impacts on tricolored blackbird  
42 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1  
2

**Table 12-1A-37. Changes in Tricolored Blackbird Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	9	9	3	3	NA	NA
		Foraging - cultivated	695	695	344	344	NA	NA
		Foraging - noncultivated	214	214	186	186	NA	NA
	Nonbreeding	Roosting	23	23	9	9	NA	NA
		Foraging - cultivated	1,847	1,847	533	533	NA	NA
		Foraging - noncultivated	102	102	77	77	NA	NA
<b>Total Impacts CM1</b>								
CM2-CM18	Breeding	Nesting	13	72	75	77	11-26	30
		Foraging - cultivated	1,657	9,525	84	359	1,837-2,598	2,124
		Foraging noncultivated	704	1,991	155	184	600-1,689	355
	Nonbreeding	Roosting	570	1,642	0	1	0-4	29
		Foraging - cultivated	3,747	23,955	54	420	222-1,057	2,506
		Foraging - noncultivated	459	1,341	0	3	42-191	158
<b>Total Impacts CM2-CM18</b>		<b>7,150</b>	<b>38,566</b>	<b>368</b>	<b>1,044</b>	<b>2,711</b>	<b>5,766</b>	
<b>Total Breeding</b>		<b>3,292</b>	<b>12,506</b>	<b>847</b>	<b>1,153</b>	<b>2,447-4,312</b>	<b>2,509</b>	
<b>Total Nonbreeding</b>		<b>6,748</b>	<b>28,910</b>	<b>673</b>	<b>1,043</b>	<b>263-1,252</b>	<b>2,694</b>	
<b>TOTAL IMPACTS</b>		<b>10,040</b>	<b>41,416</b>	<b>1,520</b>	<b>2,196</b>	<b>2,711</b>	<b>5,766</b>	

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

## 1 **Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird**

2 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
3 of up to 43,612 acres of modeled habitat (13,659 acres of breeding habitat and up to 29,953 acres of  
4 nonbreeding habitat) for tricolored blackbird (Table 12-1A-37). Conservation measures that would  
5 result in these losses are conveyance facilities and transmission line construction, and establishment  
6 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
7 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration  
8 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat  
9 enhancement and management activities (CM11), which include ground disturbance or removal of  
10 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
11 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
12 facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities  
13 is described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
14 conclusion follow the individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities would  
16 result in the permanent loss of 918 acres of tricolored blackbird breeding habitat (9 acres  
17 nesting habitat, 695 acres of cultivated lands, and 214 acres of noncultivated lands suitable for  
18 foraging) and 1,972 acres of nonbreeding habitat (23 acres roosting habitat, 1,847 acres of  
19 cultivated lands, and 102 acres of noncultivated lands suitable for foraging (Table 12-1A-37).  
20 Approximately 831 of the acres permanently impacted would be lost as reusable tunnel material  
21 storage areas, which would likely be moved to other sites for use in levee build-up and  
22 restoration, and the affected area would likely be restored. While this effect is categorized as  
23 permanent because there is no assurance that the material would eventually be moved, the  
24 effect would likely be temporary.

25 In addition, CM1 would result in the temporary removal of 533 acres of breeding habitat (3  
26 acres nesting habitat, 344 acres of cultivated lands, and 186 acres of noncultivated lands  
27 suitable for foraging) and 619 acres of nonbreeding habitat (9 acres roosting habitat, 533 acres  
28 of cultivated lands, and 77 acres of noncultivated lands suitable for foraging, Table 12-1A-37).

29 Most of the habitat that would be lost is located in the central Delta, from CZs 3-6 and CZ 8.  
30 There are no occurrences of tricolored blackbird that overlap with the construction footprint for  
31 CM1. However, records exist throughout the study area. The implementation of *AMM21*  
32 *Tricolored Blackbird* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) would require  
33 pre-construction surveys and the establishment of no-disturbance buffers and would minimize  
34 potential effects on nesting tricolored blackbirds. Refer to the Terrestrial Biology Map Book for a  
35 detailed view of Alternative 1A construction locations. Construction of CM1 would occur within  
36 the first 10 years of Alternative 1A implementation.

- 37 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries  
38 improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird  
39 breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of  
40 noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting  
41 entirely of roosting habitat). In addition, CM2 construction would result in the temporary  
42 removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands,  
43 and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat  
44 (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of  
45 Alternative 1A implementation.

- 1       • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
2       in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21  
3       acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable  
4       for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of  
5       cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated  
6       13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal  
7       emergent wetland communities that could provide nonbreeding season roosting habitat for  
8       tricolored blackbirds, depending on future vegetation density and composition. Conversion  
9       would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34  
10      acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated  
11      habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated  
12      lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and  
13      conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent  
14      loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop  
15      into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored  
16      blackbird.
- 17      • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration  
18      associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent  
19      removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,  
20      503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and  
21      656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3  
22      acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub  
23      associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat  
24      managed as early- to mid-successional habitats (as a component of CM5) could provide suitable  
25      nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have  
26      developed habitat functions for the species.
- 27      • *CM8 Grassland Natural Communities Restoration*: Restoration of grassland would result in the  
28      permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding  
29      habitat. Grassland restoration would be implemented on cultivated lands and would therefore  
30      result in the conversion of tricolored blackbird cultivated foraging habitat to high-value  
31      grassland foraging habitat in CZs 2, 4, and 5.
- 32      • *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent  
33      removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and  
34      945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of  
35      the restored nontidal marsh would be open water, and the remainder would support emergent  
36      wetland vegetation that could provide low-value roosting habitat for tricolored blackbird  
37      depending on vegetation density and composition.
- 38      • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
39      actions that are designed to enhance wildlife values in BDCP-protected habitats could result in  
40      localized ground disturbances that could temporarily remove small amounts of tricolored  
41      blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
42      road and other infrastructure maintenance, would be expected to have minor effects on  
43      available tricolored blackbird habitat and are expected to result in overall improvements to and  
44      maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects  
45      cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
46      the AMMs listed below. CM11 would also include the construction of recreational-related

1 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*  
2 *and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
3 etc. would be placed on existing, disturbed areas when and where possible. However,  
4 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland  
5 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts  
6 from recreational-related facilities that would occur within the first 10 years of Plan  
7 implementation would include a loss of 13 acres of breeding habitat.

- 8 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
9 tricolored blackbird grassland foraging habitat in CZ 1.
- 10 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
11 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
12 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent  
13 to work areas. Maintenance activities would include vegetation management, levee and  
14 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
15 would be reduced by AMMs and conservation actions as described below.
- 16 ● *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or  
17 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to  
18 land clearing activities, nest abandonment, or increased exposure to the elements or to  
19 predators. Injury to or mortality of adults and fledged juveniles would not be expected as  
20 individuals would be expected to avoid contact with construction equipment. Construction  
21 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,  
22 contouring, and other initial ground-disturbing operations that could temporarily reduce the  
23 extent and functions supported by the affected habitat. To the maximum extent practicable,  
24 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,  
25 from an active tricolored blackbird nesting colony. If monitoring determines an activity is  
26 adversely affecting a nesting colony, construction will be modified, as practicable, by either  
27 delaying construction until the colony site is abandoned or until the end of the breeding season,  
28 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access  
29 to the construction site. These measures to avoid injury or mortality of nesting tricolored  
30 blackbirds are described in *AMM21 Tricolored Blackbird* (BDCP Appendix 3.C, *Avoidance and*  
31 *Minimization Measures*).

32 The following paragraphs summarize the combined effects discussed above and describe other  
33 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
34 included.

### 35 ***Near-Term Timeframe***

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
38 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
39 effects of construction would not be adverse under NEPA. The Plan would remove 4,139 acres of  
40 breeding habitat (100 acres of nesting, 1,207 acres of cultivated lands, and 1,259 acres of  
41 noncultivated lands suitable for foraging) and 7,421 acres of nonbreeding habitat (602 acres of  
42 roosting, 4,867 acres of cultivated lands, and 638 acres of noncultivated lands suitable for foraging)  
43 for tricolored blackbird in the study area in the near-term. These effects would result from the  
44 construction of the water conveyance facilities (CM1, 1,451 acres of breeding, 2,591 acres of

1 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
2 *Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
3 *Restoration, and CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres  
4 of nonbreeding).

5 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
6 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
7 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
8 protection for the loss of cultivated lands.

9 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
10 blackbird habitat from CM1 would require 12 acres of restoration and 12 acres of protection of  
11 nesting habitat, 32 acres of restoration and 32 acres of protection of roosting habitat, 1,158 acres of  
12 protection of noncultivated lands that provide foraging habitat, 1,039 acres of protection of  
13 cultivated lands suitable for foraging during the breeding season, and 1,066 acres of cultivated lands  
14 that provide foraging habitat during the nonbreeding season. The near-term effects of other  
15 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
16 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
17 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
18 nonbreeding season. Compensation for these losses from other conservation measures would  
19 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
20 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
21 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands  
22 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
23 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

24 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
25 typical ratios above would be 100 acres of restoration and 100 acres of protection for nesting  
26 habitat, 602 acres of restoration and 602 acres of protection for roosting habitat, 2,277 acres of  
27 protection of noncultivated foraging habitat, 2,780 acres of protection for cultivated lands that  
28 provide foraging habitat during the breeding season, and 4,867 acres of cultivated lands that  
29 provide foraging habitat during the nonbreeding season.

30 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
31 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
32 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
33 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
34 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
35 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
36 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).  
37 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in  
38 the same timeframe as the construction and early restoration losses. Some proportion of these  
39 natural communities provide suitable habitat for tricolored blackbird as described below.

40 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
41 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
42 wetland, in close association with highly productive foraging areas that support abundant insect  
43 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
44 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs

1 1, 2, 8, or 11 (see Table 12-4-38 for foraging habitat values) and would be actively managed to  
2 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
3 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*  
4 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
5 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
6 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
7 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of  
8 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
9 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
10 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of  
11 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

12 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal  
13 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
14 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*  
15 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
16 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
17 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
18 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
19 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
20 valley/foothill riparian, 720 acres managed wetland).

21 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
22 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
23 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
24 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The  
25 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
26 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
27 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
28 reproductive success in tricolored blackbirds. These natural communities are known to support  
29 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
30 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
31 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
32 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
33 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
34 and GNC2.4).

35 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
36 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
37 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
38 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
39 term. Assuming that lands would be protected proportional to the conservation objectives for  
40 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
41 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
42 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
43 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
44 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
45 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
46 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of



1 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
2 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
3 habitats for species including tricolored blackbird would also be protected that occur within the  
4 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
5 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
6 tricolored blackbird (Objective CLNC1.3).

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
12 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
13 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

14 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
15 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
16 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
17 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
18 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
19 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
20 by this acreage and temporary impacts on grassland would be restored to preproject conditions  
21 (including revegetation with native vegetation if within 1 year of completion of construction under  
22 *AMM2 Construction Best Management Practices and Monitoring. With the enhancement of grasslands*  
23 *described above, and the restoration of temporary habitat impacts, this difference between*  
24 *impacted and conserved grassland acreages in the near-term time period would not result in an*  
25 *adverse effect on tricolored blackbird.*

26 **Table 12-1A-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season <sup>a</sup> Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, millet, alfalfa and mixed alfalfa, mixed pasture, native pasture, induced high water table native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grass pasture, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Wheat, mixed grain and hay, farmsteads	Wheat, oats, mixed grain and hay, farmsteads
Marginal	Rice	None
None	All remaining crop types	All remaining crop types

<sup>a</sup> Generally March through August; occasional breeding in fall (September through November).

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
3 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
4 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
5 breeding habitat available, the study area does not currently support many nesting tricolored  
6 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
7 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).  
8 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 13,659  
9 acres of breeding habitat and 29,953 acres of nonbreeding habitat for tricolored blackbird during  
10 the term of the Plan (8% of the total breeding habitat in the study area and 8% of the total  
11 nonbreeding habitat in the study area). The locations of these losses are described above in the  
12 analyses of individual conservation measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
14 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
15 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Communities*  
16 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
17 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
18 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
19 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
20 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

21 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or  
22 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
23 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
24 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-  
25 1A-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan  
26 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,  
27 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,  
28 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of  
29 moderate-, high-, or very high-value cultivated lands would be conserved and managed as  
30 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective  
31 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging  
32 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15  
33 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of  
34 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant  
35 throughout the study area, so the loss is not expected to adversely affect the population in the study  
36 area.

37 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6.12.2) estimates that the  
38 restoration and protection actions discussed above could result in the protection of an estimated  
39 46,566 acres of tricolored blackbird habitat (16,476 acres breeding habitat and 31,090 acres  
40 nonbreeding habitat) and restoration of 31,001 acres of tricolored blackbird habitat (2,190 acres  
41 breeding habitat and 28,811 acres nonbreeding habitat).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

4 **NEPA Effects:** The losses of tricolored blackbird habitat and potential for direct mortality of a  
5 special-status species under Alternative 1A would represent an adverse effect in the absence of  
6 other conservation actions. However, with habitat protection and restoration associated with CM3,  
7 CM4, CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives, and by AMM1–  
8 AMM7 and *AMM21 Tricolored Blackbird*, which would be in place throughout the construction  
9 period, the effects of habitat loss and potential mortality on tricolored blackbird would not be  
10 adverse under Alternative 1A.

11 **CEQA Conclusion:**

12 **Near-Term Timeframe**

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
16 effects of construction would be less than significant under CEQA. The Plan would remove 4,139  
17 acres of breeding habitat (100 acres of nesting, 1,207 acres of cultivated lands, and 1,259 acres of  
18 noncultivated lands suitable for foraging) and 7,421 acres of nonbreeding habitat (602 acres of  
19 roosting, 4,867 acres of cultivated lands, and 638 acres of noncultivated lands suitable for foraging)  
20 for tricolored blackbird in the study area in the near-term. These effects would result from the  
21 construction of the water conveyance facilities (CM1, 1,451 acres of breeding, 2,591 acres of  
22 nonbreeding habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
23 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
24 *Restoration*, and *CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres  
25 of nonbreeding habitat).

26 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
27 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
28 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
29 protection for the loss of cultivated lands.

30 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
31 blackbird habitat from CM1 would require 12 acres of restoration and 12 acres of protection of  
32 nesting habitat, 32 acres of restoration and 32 acres of protection of roosting habitat, 1,158 acres of  
33 protection of noncultivated lands that provide foraging habitat, 1,039 acres of protection of  
34 cultivated lands suitable for foraging during the breeding season, and 1,066 acres of cultivated lands  
35 that provide foraging habitat during the nonbreeding season. The near-term effects of other  
36 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
37 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
38 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
39 nonbreeding season. Compensation for these losses from other conservation measures would  
40 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
41 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
42 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands  
43 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
44 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

1 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
2 typical ratios above would be 100 acres of restoration and 100 acres of protection for nesting  
3 habitat, 602 acres of restoration and 602 acres of protection for roosting habitat, 2,277 acres of  
4 protection of noncultivated foraging habitat, 2,780 acres of protection for cultivated lands that  
5 provide foraging habitat during the breeding season, and 4,867 acres of cultivated lands that  
6 provide foraging habitat during the nonbreeding season.

7 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
8 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
9 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
10 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
11 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
12 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
13 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).  
14 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in  
15 the same timeframe as the construction and early restoration losses. Some proportion of these  
16 natural communities provide suitable habitat for tricolored blackbird as described below.

17 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
18 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
19 wetland, in close association with highly productive foraging areas that support abundant insect  
20 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
21 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs  
22 1, 2, 8, or 11 (see Table 12-1A-38 for foraging habitat values) and would be actively managed to  
23 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
24 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*  
25 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
26 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
27 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
28 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of  
29 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
30 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
31 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of  
32 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

33 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal  
34 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
35 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*  
36 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
37 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
38 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
39 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
40 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
41 valley/foothill riparian, 720 acres managed wetland).

42 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
43 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
44 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
45 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The

1 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
2 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
3 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
4 reproductive success in tricolored blackbirds. These natural communities are known to support  
5 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
6 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
7 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
8 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
9 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
10 and GNC2.4).

11 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
12 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
13 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
14 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
15 term. Assuming that lands would be protected proportional to the conservation objectives for  
16 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
17 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
18 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
19 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
20 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
21 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
22 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of  
23 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
24 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
25 habitats for species including tricolored blackbird would also be protected that occur within the  
26 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
27 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
28 tricolored blackbird (Objective CLNC1.3).

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
34 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
35 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

36 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
37 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
38 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
39 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
40 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
41 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
42 by this acreage and temporary impacts on grassland would be restored to preproject conditions  
43 (including revegetation with native vegetation if within 1 year of completion of construction under  
44 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands  
45 described above, and the restoration of temporary habitat impacts, this difference between

1 impacted and conserved grassland acreages in the near-term time period would not result in a  
2 significant impact on tricolored blackbird.

3 **Late Long-Term Timeframe**

4 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
5 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
6 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
7 breeding habitat available, the study area does not currently support many nesting tricolored  
8 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
9 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).  
10 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 13,659  
11 acres of breeding habitat and 29,953 acres of nonbreeding habitat for tricolored blackbird during  
12 the term of the Plan (8% of the total breeding habitat in the study area and 8% of the total  
13 nonbreeding habitat in the study area). The locations of these losses are described above in the  
14 analyses of individual conservation measures.

15 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
16 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
17 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
18 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
19 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
20 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
21 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
22 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

23 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or  
24 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
25 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
26 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-  
27 1A-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan  
28 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,  
29 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,  
30 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of  
31 moderate-, high-, or very high-value cultivated lands would be conserved and managed as  
32 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective  
33 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging  
34 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15  
35 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of  
36 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant  
37 throughout the study area, so the loss is not expected to adversely affect the population in the study  
38 area.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6.12.2) estimates that the  
40 restoration and protection actions discussed above could result in the protection of an estimated  
41 46,566 acres of tricolored blackbird habitat (16,476 acres of breeding habitat and 31,090 acres of  
42 nonbreeding habitat) and restoration of 31,001 acres of tricolored blackbird habitat (2,190 acres of  
43 breeding habitat and 28,811 acres of nonbreeding habitat).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
6 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
7 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Considering  
8 Alternative 1A's protection and restoration provisions, which would provide acreages of new or  
9 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
10 and restoration activities, and implementation of AMM1–AMM7, and *AMM21 Tricolored Blackbird*,  
11 the loss of habitat or direct mortality through the implementation of Alternative 1A as a whole would  
12 not result in a substantial adverse effect through habitat modifications and would not substantially  
13 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-  
14 than-significant impact on tricolored blackbird.

### 15 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 16 **Facilities**

17 New transmission lines would increase the risk that tricolored blackbirds could be subject to power  
18 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would  
19 have the potential to intersect the proposed transmission lines largely due to winter movements  
20 throughout the study area, when individuals are migrating in large flocks and dense fog is common  
21 in the area). Although migratory movements may increase the risk of strike hazard, daily flights  
22 associated with winter foraging likely occurs in smaller flocks at heights that are lower than the  
23 transmission lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*  
24 *Transmission Lines*). Transmission line poles and towers provide perching substrate for raptors,  
25 which could result in increased predation pressure on local tricolored blackbirds. The existing  
26 network of transmission lines in the Plan Area currently poses these risks and any incremental risk  
27 associated with the new power line corridors would not be expected to affect the study area  
28 population. *AMM20 Greater Sandhill Crane*, would further reduce any potential effects of  
29 transmission lines on tricolored blackbird.

30 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline  
31 strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane*, would  
32 reduce the potential impact of the construction of new transmission lines on tricolored blackbird  
33 and would not result in an adverse effect on the species.

34 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird  
35 powerline strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane*,  
36 would reduce the potential impact of the construction of new transmission lines on tricolored  
37 blackbird to a less-than-significant level.

### 38 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

39 **Indirect construction- and operation-related effects:** Tricolored blackbird nesting habitat within  
40 the vicinity of proposed construction areas that could be indirectly affected by construction  
41 activities. Construction noise above background noise levels (greater than 50 dBA) could extend  
42 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,  
43 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),

1 although there are no available data to determine the extent to which these noise levels could affect  
2 tricolored blackbird. Indirect effects associated with construction include noise, dust, and visual  
3 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside  
4 the project footprint but within 1,300 feet from the construction edge. Construction and subsequent  
5 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
6 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*  
7 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be  
8 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where  
9 practicable until breeding has ceased. In addition, monitoring would be implemented to ensure that  
10 construction does not adversely affect the nesting colony. The use of mechanical equipment during  
11 water conveyance facilities construction could cause the accidental release of petroleum or other  
12 contaminants that could affect tricolored blackbird in the surrounding habitat. The inadvertent  
13 discharge of sediment or excessive dust adjacent to tricolored blackbird habitat could also affect the  
14 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
15 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
16 from the construction area and negative effects of dust on active nests.

17 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
18 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain  
19 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
20 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
21 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
22 restoration activities that create newly inundated areas could increase bioavailability of mercury  
23 (see BDCP Chapter 3 *Conservation Strategy*, for details of restoration).

24 The potential mobilization or creation of methylmercury within the study area varies with site-  
25 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
26 *Management* contains provisions for project-specific Mercury Management Plans. Breeding  
27 tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure because  
28 tidal wetlands are not expected to be a major foraging area for the species. Furthermore, the Suisun  
29 Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored under the  
30 plan would generate less methylmercury than the existing managed wetlands, potentially reducing  
31 the overall risk. However, species sensitivity to methylmercury differs widely and there is a large  
32 amount of uncertainty with respect to species-specific effects and increased methylmercury  
33 associated with natural community and floodplain restoration could indirectly affect tricolored  
34 blackbird, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).  
35 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
36 monitoring and adaptive management as described in CM12 would be available to address the  
37 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on tricolored  
38 blackbird.

39 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
40 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
41 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
42 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
43 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
44 classes within a species. In addition, the effect of selenium on a species can be confounded by  
45 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
46 2009).



1 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
2 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
3 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
4 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
5 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
6 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
7 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
8 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
9 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
10 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
11 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
12 levels of selenium have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
15 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh  
16 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
17 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
18 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
19 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
20 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
21 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
22 long-term increases in selenium concentrations in water in the Delta under any alternative.  
23 However, it is difficult to determine whether the effects of potential increases in selenium  
24 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
25 lead to adverse effects on tricolored blackbird.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a  
27 substantial effect on tricolored blackbird from increases in selenium associated with restoration  
28 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
29 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
30 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
31 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
32 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
33 separately for each restoration effort as part of design and implementation. This avoidance and  
34 minimization measure would be implemented as part of the tidal habitat restoration design  
35 schedule.

36 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and  
37 sedimentation, and operations and maintenance of the water conveyance facilities would not be  
38 adverse with the implementation of AMM1-AMM7 and *AMM21 Tricolored Blackbird*. Tidal habitat  
39 restoration could result in increased exposure of California least tern to selenium. This effect would  
40 be addressed through the implementation of *AMM27, Selenium Management* which would provide  
41 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
42 selenium and its bioavailability in tidal habitats. The implementation of tidal natural communities  
43 restoration or floodplain restoration could result in increased exposure of tricolored blackbird to  
44 methylmercury. It is unlikely that breeding tricolored blackbird would be highly susceptible to  
45 methylmercury exposure because tidal wetlands are not expected to be a major foraging area for the  
46 species. However, it is unknown what concentrations of methylmercury are harmful to this species

1 and the potential for increased exposure varies substantially within the study area. Site-specific  
2 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
3 adaptive management as described in *CM12 Methylmercury Management*, would better inform the  
4 potential effects of methylmercury on tricolored blackbird. The site-specific planning phase of  
5 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury  
6 exposure for tricolored blackbird, once site specific sampling and other information could be  
7 developed.

8 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
9 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
10 than significant with the implementation of *AMM21 Tricolored Blackbird* and *AMM1-AMM7*. Tidal  
11 habitat restoration could result in increased exposure of California least tern to selenium. This  
12 impact would be addressed through the implementation of *AMM27, Selenium Management* which  
13 would provide specific tidal habitat restoration design elements to reduce the potential for  
14 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal  
15 natural communities restoration or floodplain restoration could result in increased exposure of  
16 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be  
17 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major  
18 foraging area for the species. However, it is unknown what concentrations of methylmercury are  
19 harmful to this species. Site-specific restoration plans that address the creation and mobilization of  
20 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*  
21 *Management*, would better inform the potential impacts of methylmercury on tricolored blackbird.  
22 With these measures in place, indirect effects from Alternative 1A would have a less-than-significant  
23 impact on tricolored blackbird.

#### 24 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of** 25 **Implementation of Conservation Components**

26 Flooding of the Yolo Bypass (CM2) would inundate 2,447–4,312 acres of breeding habitat and 263–  
27 1,252 acres of nonbreeding habitat (Table 12-1A-37). Based on hypothetical floodplain restoration,  
28 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
29 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124  
30 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of  
31 nonbreeding habitat (29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated  
32 lands suitable for foraging, Table 12-1A-37) resulting in the temporary loss of these habitats.  
33 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to  
34 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current  
35 flooding regime. However, this inundation could reduce the availability of nesting habitat during  
36 years when flooding extends into the nesting season (past March). The periodic inundation of the  
37 Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood  
38 regime in support of wetland and riparian vegetation types that support nesting habitat. There  
39 would be no expected adverse effect on tricolored blackbird.

40 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
41 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect  
42 on tricolored blackbird because inundation is expected to take place outside of the breeding season.  
43 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
44 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

1 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
2 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant  
3 impact on tricolored blackbird because inundation is expected to take place outside of the breeding  
4 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
5 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

## 6 **Western Burrowing Owl**

7 This section describes the effects of Alternative 1A, including water conveyance facilities  
8 construction and implementation of other conservation components, on western burrowing owl.  
9 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and  
10 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural  
11 communities and pasture. Low-value habitat includes plant alliances and crop types from managed  
12 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported  
13 species use patterns from the literature.

14 Construction and restoration associated with Alternative 1A conservation measures would result in  
15 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in  
16 Table 12-1A-39. Full implementation of Alternative 1A would also include the following  
17 conservation actions over the term of the BDCP to benefit the western burrowing owl (BDCP  
18 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 19 • Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value  
20 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-  
21 value habitat (Objective WBO1.1, associated with CM3).
- 22 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
23 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
24 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 25 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 26 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
27 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 28 • Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to  
29 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9)
- 30 • Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3,  
31 ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11)
- 32 • Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and  
33 other native wildlife species and maintain and protect the small patches of important wildlife  
34 habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with  
35 CM3)

36 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
37 management activities that would enhance habitat for the species and implementation of AMM1-  
38 AMM7 and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be  
39 adverse for NEPA purposes and would be less than significant for CEQA purposes.

40

1 **Table 12-1A-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative**  
2 **1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	499	499	460	460	NA	NA
	Low-value	2,478	2,478	766	766	NA	NA
<b>Total Impacts CM1</b>		<b>2,977</b>	<b>2,977</b>	<b>1,226</b>	<b>1,226</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	High-value	4,487	11,570	245	328	1,390-3,303	779
	Low-value	3,527	28,506	144	971	1,522-2,927	6,162
<b>Total Impacts CM2-CM18</b>		<b>8,014</b>	<b>40,076</b>	<b>389</b>	<b>1,299</b>	<b>2,912-6,230</b>	<b>6,941</b>
<b>Total High-value</b>		<b>4,986</b>	<b>12,069</b>	<b>705</b>	<b>788</b>	1,390-3,303	779
<b>Total Low-value</b>		<b>6,005</b>	<b>30,984</b>	<b>910</b>	<b>1,737</b>	1,522-2,927	6,162
<b>TOTAL IMPACTS</b>		<b>10,991</b>	<b>43,053</b>	<b>1,615</b>	<b>2,525</b>	<b>2,912-6,230</b>	<b>6,941</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing**  
5 **Owl**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 45,578 acres of modeled habitat for western burrowing owl (of which 12,857 acres is of  
8 high-value and 32,721 acres is of low-value, Table 12-1A-39). Conservation measures that would  
9 result in these losses are conveyance facilities and transmission line construction, and establishment  
10 and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*  
11 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel Margin*  
12 *Enhancement*, *CM8 Grassland Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, and  
13 *CM18 Conservation Hatcheries*. The majority of habitat loss would result from CM4. Habitat  
14 enhancement and management activities (CM11), which include ground disturbance or removal of  
15 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
17 facilities could degrade or eliminate western burrowing owl habitat. Each of these individual  
18 activities is described below. A summary statement of the combined impacts, NEPA effects and a  
19 CEQA conclusion follow the individual conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
21 result in the combined permanent and temporary loss of up to 959 acres of modeled

1 high-value western burrowing owl habitat (499 acres of permanent loss, 460 acres of temporary  
2 loss) from CZs 3–6 and CZ 8. In addition, 3,244 acres of low-value burrowing owl habitat would  
3 be removed (2,478 acres of permanent loss, 766 acres of temporary loss) from CZs 3–6 and CZ 8.  
4 The majority of high-value grassland that would be removed would be in CZ 8, from the  
5 construction of the new forebay in CZ 8. The footprint for CM1 does not overlap with any  
6 occurrences of western burrowing owl. However, there is a high concentration of CNDDDB and  
7 DHCCP survey records for western burrowing owls in CZ 8 to the west and the south of the  
8 Clifton Court Forebay. The loss of high-value habitat from facility construction and the  
9 establishment of the forebay borrow and spoils area could remove occupied habitat, displace  
10 nesting and wintering owls, and fragment occupied burrowing owl habitat. The implementation  
11 of *AMM23 Western Burrowing Owl* would minimize effects on western burrowing owl if they  
12 were present in the construction area. Refer to the Terrestrial Biology Map Book for a detailed  
13 view of Alternative 1A construction locations. Impacts resulting from CM1 would occur within  
14 the first 10 years of Alternative 1A implementation.

- 15 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
16 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value  
17 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in  
18 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres  
19 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10  
20 years of Alternative 1A implementation.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
22 inundation would permanently remove an estimated 29,668 acres of modeled western  
23 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted  
24 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value  
25 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact  
26 and fragment remaining high-value grassland habitat just north of Rio Vista in and around  
27 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal  
28 natural community restoration efforts would impact one extant record of burrowing owl just  
29 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.
- 30 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
31 seasonally inundated floodplain would permanently and temporarily remove approximately  
32 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of  
33 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be  
34 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San  
35 Joaquin, Old, and Middle Rivers in CZ 7.
- 36 ● *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located  
37 along levees where western burrowing owl could be present. The species is known to use often  
38 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*  
39 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities  
40 to disturb owls or affect active nests.
- 41 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
42 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In  
43 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and  
44 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.

- 1       • *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be  
2       implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362  
3       acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The  
4       conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily  
5       remove available habitat but would ultimately have a beneficial effect on the western burrowing  
6       owl.
- 7       • *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of  
8       159 acres of high-value and 952 acres of low-value western burrowing owl habitat.
- 9       • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
10      actions that are designed to enhance wildlife values in restored or protected habitats could  
11      result in localized ground disturbances that could temporarily remove small amounts of  
12      western burrowing owl habitat. The burrowing owl's fossorial habits make the species more  
13      sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,  
14      such as removal of nonnative vegetation and road and other infrastructure maintenance  
15      activities, would be expected to have minor adverse effects on available western burrowing owl  
16      habitat and would be expected to result in overall improvements to and maintenance of habitat  
17      values over the term of the BDCP. CM11 would also include the construction of recreational-  
18      related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*  
19      *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging  
20      areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and  
21      where possible. However, approximately 50 acres of grassland habitat would be lost from the  
22      construction of trails and facilities.
- 23      Habitat management- and enhancement-related activities and equipment operation could  
24      destroy nests burrows, and noise and visual disturbances could lead to their abandonment,  
25      resulting in mortality of eggs and nestlings. The potential for these activities to result in nest  
26      failure and mortality or other adverse effects on western burrowing owl would be avoided or  
27      minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would  
28      require surveys to determine presence or absence and the establishment of no-disturbance  
29      buffers around active sites.
- 30      • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
31      value western burrowing owl habitat for the development of a delta and longfin smelt  
32      conservation hatchery in CZ 1.
- 33      • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
34      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
35      disturbances that could affect western burrowing owl use of the surrounding habitat.  
36      Maintenance activities would include vegetation management, levee and structure repair, and  
37      re-grading of roads and permanent work areas. These effects, however, would be reduced by  
38      AMMs and conservation actions as described below.
- 39      • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
40      western burrowing owl. However, if nest burrows were occupied in the vicinity of construction  
41      activities, equipment operation could destroy nests and noise and visual disturbances could lead  
42      to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys  
43      detected any occupied burrows and no-disturbance buffers would be implemented.

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

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

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 effects of construction would not be adverse under NEPA. The Plan would remove 5,691 acres  
9 (4,986 acres permanent, 705 acres temporary) of high-value habitat for western burrowing owl in  
10 the study area in the near-term. These effects would result from the construction of the water  
11 conveyance facilities (CM1, 959 acres), and implementing other conservation measures (CM2 *Yolo*  
12 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural*  
13 *Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali*  
14 *Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management*  
15 and CM18 *Conservation Hatcheries*—4,732 acres). In addition, 6,915 acres of low-value habitat  
16 would be removed or converted in the near-term (CM1, 3,244 acres; CM2 *Yolo Bypass Fisheries*  
17 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural Community*  
18 *Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali Seasonal*  
19 *Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management* and CM18  
20 *Conservation Hatcheries*—3,671 acres).

21 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
22 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the  
23 loss of low-value habitat would result from conversion and enhancement to high-value habitats.  
24 Using these typical ratios would indicate that 1,918 acres should be protected to compensate for the  
25 loss of high-value habitat from CM1 and that 3,244 acres should be protected to compensate for the  
26 loss of low-value habitat from CM1. The near-term effects of other conservation actions would  
27 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of  
28 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA  
29 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value  
30 habitat).

31 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
32 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
33 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
34 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
35 in the same timeframe as the construction and early restoration losses.

36 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
37 owl populations in the plan area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
38 7, 8, and 11. (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
39 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
40 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
41 pool natural communities which would provide habitat for western burrowing owl and reduce the  
42 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
43 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl  
44 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would

1 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
2 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
3 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
4 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
5 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
6 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
7 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
8 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
9 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
10 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
11 standards for considering the effectiveness of conservation actions.

12 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
13 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
14 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
15 CM1 on western burrowing owl habitat. Some portion of the 15,400 acres of cultivated lands  
16 protected in the near-term timeframe would include high-value crop types. These acres, in addition  
17 to the management and enhancement activities that are contained in the Plan goals, would satisfy  
18 the typical mitigation ratios that would be applied to the other near-term conservation actions,  
19 providing that the 15,400 acres of cultivated lands protected in the near-term were managed in  
20 suitable crop types to compensate for the loss of high-value habitat at a ratio of 2:1. Mitigation  
21 Measure BIO-91, *Compensate for Near-Term Loss of High-Value Western Burrowing Owl Habitat*,  
22 would be available to address the potential effect of high-value habitat loss in the near-term. The  
23 acres of protection of cultivated lands would be sufficient to compensate for the loss of low-value  
24 burrowing owl habitat from CM1 and from the other near-term conservation actions.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
30 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
31 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 32 **Late Long-Term Timeframe**

33 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and  
34 254,352 acres of low-value habitat for western burrowing owl. Alternative 1A as a whole would  
35 result in the permanent loss of and temporary effects on 12,857 acres of high-value habitat and  
36 32,721 acres of low value habitat over the term of the Plan. The locations of these losses are  
37 described above in the analyses of individual conservation measures.

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
39 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
40 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
41 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
42 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
43 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
44 7, 8, and 11. (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be



1 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
2 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
3 pool natural communities which would provide habitat for western burrowing owl and reduce the  
4 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
5 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl  
6 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
7 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
8 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
9 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
10 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated  
11 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives  
12 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres  
13 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within  
14 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under  
15 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
16 populations would be increased on protected lands, enhancing the foraging value of these natural  
17 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would  
18 be increased on protected natural communities by encouraging ground squirrel occupancy and  
19 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
20 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

21 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
22 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
23 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres of high-  
24 value and 25,177 acres of low-value habitat) and restoration of 1,645 acres of western burrowing  
25 owl habitat (1,642 acres of high-value and 3 acres of low-value habitat).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
31 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
32 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

33 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-  
34 status species under Alternative 1A would represent an adverse effect in the absence of other  
35 conservation actions. With habitat protection and restoration associated with CM3, CM8, and CM11,  
36 guided by biological goals and objectives and by AMM1–AMM7 and *AMM23 Western Burrowing Owl*,  
37 and with the implementation of Mitigation Measure BIO-91, *Compensate For the Near-Term Loss of*  
38 *High-Value Burrowing Owl Habitat*, which would be available to guide the near-term protection and  
39 management of cultivated lands, the effects of habitat loss and potential mortality on western  
40 burrowing owl would not be adverse under Alternative 1A.

#### 41 **CEQA Conclusion:**

#### 42 **Near-Term Timeframe**

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
2 effects of construction would be less than significant under CEQA. The Plan would remove 5,691  
3 acres (4,986 acres permanent, 705 acres temporary) of high-value habitat for western burrowing  
4 owl in the study area in the near-term. These effects would result from the construction of the water  
5 conveyance facilities (CM1, 959 acres), and implementing other conservation measures (*CM2 Yolo*  
6 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
7 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
8 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
9 and *CM18 Conservation Hatcheries*—4,732 acres). In addition, 6,915 acres of low-value habitat  
10 would be removed or converted in the near-term (CM1, 3,244 acres; *CM2 Yolo Bypass Fisheries*  
11 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*  
12 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*  
13 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*  
14 *Conservation Hatcheries*—3,671 acres).

15 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
16 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the  
17 loss of low-value habitat would result from conversion and enhancement to high-value habitats.  
18 Using these typical ratios would indicate that 2,464 acres should be protected to mitigate the loss of  
19 high-value habitat from CM1 and that 3,702 acres should be protected to mitigate the loss of low-  
20 value habitat from CM1. The near-term effects of other conservation actions would require 9,464  
21 acres of protection to mitigate the loss of high-value habitat and 3,671 acres of protection to  
22 compensate for the loss of low-value habitat using the same typical NEPA and CEQA ratios (2:1  
23 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value habitat).

24 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
25 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
26 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
27 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
28 in the same timeframe as the construction and early restoration losses.

29 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
30 owl populations in the plan area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
31 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
32 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
33 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
34 pool natural communities which would provide habitat for western burrowing owl and reduce the  
35 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
36 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl  
37 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
38 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
39 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
40 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
41 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
42 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
43 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
44 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
45 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
46 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,

1 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
2 standards for considering the effectiveness of conservation actions.

3 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
4 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
5 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
6 CM1 on western burrowing owl habitat. Some portion of the 15,400 acres of cultivated lands  
7 protected in the near-term timeframe would include high-value crop types. These acres, in addition  
8 to the management and enhancement activities that are contained in the Plan goals, would satisfy  
9 the typical mitigation ratios that would be applied to the other near-term conservation actions,  
10 providing that the 15,400 acres of cultivated lands protected in the near-term were managed in  
11 suitable crop types to compensate for the loss of high-value habitat at a ratio of 2:1. Mitigation  
12 Measure BIO-91, *Compensate for Near-Term Loss of High-Value Western Burrowing Owl Habitat*,  
13 would reduce the impact of high-value habitat loss in the near-term. The acres of protection of  
14 cultivated lands would be sufficient to compensate for the loss of low-value burrowing owl habitat  
15 from CM1 and from the other near-term conservation actions.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
21 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
22 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

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

24 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and  
25 254,352 acres of low-value habitat for western burrowing owl. Alternative 1A as a whole would  
26 result in the permanent loss of and temporary effects on 12,857 acres of high-value habitat and  
27 32,721 acres of low value habitat over the term of the Plan. The locations of these losses are  
28 described above in the analyses of individual conservation measures.

29 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
30 *Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali*  
31 *Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland  
32 natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal  
33 wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native  
34 wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1,  
35 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11  
36 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1  
37 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and  
38 vernal pool natural communities which would provide habitat for western burrowing owl and  
39 reduce the effects of current levels of habitat fragmentation. This protection would not only expand  
40 the amount of protected high-value habitat in the Plan Area, but also support existing western  
41 burrowing owl populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11,  
42 which would especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo  
43 Bay. Certain types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some  
44 row crops can provide foraging habitat for western burrowing owl. Under appropriate management

1 regimes, cultivated lands can support breeding and wintering burrowing owls. To ensure that  
2 cultivated lands conservation benefits western burrowing owl, the Plan's biological goals and  
3 objectives further specify that, of the cultivated lands protected in the late long-term, at least 1,000  
4 acres would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are  
5 within 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1).  
6 Under *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
7 populations would be increased on protected lands, enhancing the foraging value of these natural  
8 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would  
9 be increased on protected natural communities by encouraging ground squirrel occupancy and  
10 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
11 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
13 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
14 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
15 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
16 habitat (1,642 acres high-value and 3 acres low-value habitat).

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19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
21 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
22 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
23 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

24 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
25 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
26 construction and restoration activities, and implementation of AMM1-AMM7, *AMM23 Western*  
27 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*  
28 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and  
29 management of cultivated lands, the loss of habitat and direct mortality through implementation of  
30 Alternative 1A would not result in a substantial adverse effect through habitat modifications and  
31 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of  
32 habitat or potential mortality under this alternative would have a less-than-significant impact on  
33 western burrowing owl.

#### 34 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western** 35 **Burrowing Owl Habitat**

36 Because the BDCP lacks acreage commitment for crop types that would be protected and  
37 managed within the 15,400 acres of cultivated lands protected in the near-term time period,  
38 DWR will compensate for the loss of high-value burrowing owl habitat with high-value natural  
39 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

#### 40 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission** 41 **Facilities**

42 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
43 which could result in injury or mortality of western burrowing owl. The species is large-bodied but

1 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls  
2 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,  
3 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk  
4 species for powerline collision. While the species is not widespread in the study area, it may become  
5 more widely distributed as grassland enhancement improves habitat for the species. Even so, the  
6 risk of effects on the population are low, given the species' physical and behavioral characteristics  
7 (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).  
8 New transmission lines would not be expected to have an adverse effect on the species.

9 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
10 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal  
11 based on the owl's physical and behavioral characteristics.

12 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
13 significant impact on western burrowing owl because the risk of bird strike is considered to be  
14 minimal based on the owl's physical and behavioral characteristics.

### 15 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

16 Noise and visual disturbances associated with construction-related activities could result in  
17 temporary disturbances that affect western burrowing owl use of modeled habitat adjacent to  
18 proposed construction areas. Indirect effects associated with construction include noise, dust, and  
19 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.  
20 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season  
21 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January  
22 31) could potential displace winter owls or cause abandonment of active nests. These potential  
23 effects would be minimized with the implementation of *AMM23 Western Burrowing Owl* into the  
24 BDCP, which would require preconstruction surveys and establish no-disturbance buffers around  
25 active burrows. Construction noise above background noise levels (greater than 50 dBA) could  
26 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment  
27 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),  
28 although there are no available data to determine the extent to which these noise levels could affect  
29 western burrowing owl.

30 The use of mechanical equipment during water conveyance facilities construction could cause the  
31 accidental release of petroleum or other contaminants that could affect western burrowing owl in  
32 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
33 western burrowing owl habitat could also affect the species. AMM1–AMM7 in addition to *AMM23*  
34 *Western Burrowing Owl* would minimize the likelihood of such spills and ensure that measures were  
35 in place to prevent runoff from the construction area and any adverse effects of dust on active nests.

36 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 1A  
37 implementation could have adverse effects on this species through the modification of habitat and  
38 potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential to  
39 disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton Court  
40 Forebay and adjacent to work area. With the implementation of AMM1–AMM7, and *AMM23 Western*  
41 *Burrowing Owl*, the indirect effects resulting from Alternative 1A implementation would not be  
42 adverse under NEPA.

1 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 1A  
2 implementation could have significant impacts on these species through the modification of habitat  
3 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential  
4 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton  
5 Court Forebay and adjacent to work areas. With the implementation of AMM1–AMM7 and AMM23  
6 *Western Burrowing Owl*, the indirect effects resulting from Alternative 1A implementation would  
7 have a less-than-significant impact on western burrowing owl.

8 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result**  
9 **of Implementation of Conservation Components**

10 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
11 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,195–  
12 3,004 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-1A-39).

13 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
14 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled  
15 habitat (6,162 acres of which would be low-value foraging habitat; Table 12-1A-39).

16 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation  
17 frequency and duration of cultivated lands and grassland habitats may affect prey populations that  
18 have insufficient time to recover following inundation events. Depending on timing, seasonal  
19 inundation of western burrowing owl habitat could result in displacement from nesting burrows or  
20 drowning of individuals. The potential for this effect is considered low because suitable burrow sites  
21 would most likely be located along setback levees, which are expected to be subject to inundation  
22 less frequently than floodplain surfaces that would be less likely to support suitable nesting  
23 burrows. The periodically inundated habitat would not be expected to have an adverse effect on the  
24 population.

25 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on  
26 the population. The potential for direct mortality of western burrowing owl caused by inundation  
27 would be low because the locations of burrows would likely be above elevations consistently subject  
28 to inundation; therefore, the potential effect would not be adverse.

29 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation  
30 would be low because the locations of burrows would likely be above elevations consistently subject  
31 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant  
32 impact on the population.

33 **Western Yellow-Billed Cuckoo**

34 This section describes the effects of Alternative 1A, including water conveyance facilities  
35 construction and implementation of other conservation components, on western yellow-billed  
36 cuckoo. The habitat model for western yellow-billed cuckoo includes potential breeding habitat,  
37 which includes plant alliances from the valley/foothill riparian modeled habitat that contain a dense  
38 forest canopy for foraging with understory willow for nesting, and a minimum patch size of 50 acres.  
39 Modeled habitat also includes migratory habitat, which contains the same plant alliances as  
40 breeding habitat but without the minimum 50-acre patch size requirement.

41 The western yellow-billed cuckoo is uncommon in the Plan Area at present, and the likelihood that it  
42 will be found using the modeled habitat is low relative to more abundant riparian species. Nesting of

1 the species in the plan area has not been confirmed for approximately 100 years. Western yellow-  
2 billed cuckoo was detected in the study area during 2009 DHCCP surveys, but nesting was not  
3 confirmed and the bird is suspected to have been a migrant (Appendix 12C, *2009 to 2011 Bay Delta*  
4 *Conservation Plan EIR/EIS Environmental Data Report*). Construction and restoration associated  
5 with Alternative 1A conservation measures would result in both temporary and permanent losses of  
6 western yellow-billed cuckoo modeled habitat as indicated in Table 12-1A-40. Full implementation  
7 of Alternative 1A would also include the following conservation actions over the term of the BDCP to  
8 benefit the western yellow-billed cuckoo (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
9 *Objectives*).

- 10 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
11 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
12 associated with CM7).
- 13 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
14 10 (Objective VFRNC1.2, associated with CM3).
- 15 • Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,  
16 associated with CM3 and CM7).
- 17 • Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion  
18 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a  
19 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,  
20 associated with CM3 and CM7).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
22 management activities that would enhance these natural communities for the species and  
23 implementation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
24 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on Western yellow-billed cuckoo would not be  
25 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**  
2 **Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
	Migratory	23	23	14	14	NA	NA
<b>Total Impacts CM1</b>		<b>23</b>	<b>23</b>	<b>14</b>	<b>14</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Breeding	29	142	5	10	11-20	17
	Migratory	278	383	83	94	37-64	125
<b>Total Impacts CM2-CM18</b>		<b>307</b>	<b>525</b>	<b>88</b>	<b>104</b>	<b>48-84</b>	<b>142</b>
<b>Total Breeding</b>		<b>29</b>	<b>142</b>	<b>5</b>	<b>10</b>	11-20	17
<b>Total Migratory</b>		<b>301</b>	<b>406</b>	<b>97</b>	<b>108</b>	37-64	125
<b>TOTAL IMPACTS</b>		<b>330</b>	<b>548</b>	<b>102</b>	<b>118</b>	<b>48-84</b>	<b>142</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**  
5 **Billed Cuckoo**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 666 acres of modeled habitat for western yellow-billed cuckoo (152 acres of breeding  
8 habitat, 514 acres of migratory habitat, Table 12-1A-40). Conservation measures that would result  
9 in these losses are conveyance facilities and transmission line construction, and establishment and  
10 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat  
11 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
12 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,  
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
15 degrade or eliminate western yellow-billed cuckoo modeled habitat. Each of these individual  
16 activities is described below. A summary statement of the combined impacts and NEPA effects and a  
17 CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Conveyance Facilities and Operation:* Construction of Alternative 1A water  
19 conveyance facilities would result in the combined permanent and temporary loss of up to 37  
20 acres of modeled western yellow-billed cuckoo migratory habitat (Table 12-1A-40). No modeled  
21 breeding habitat would be impacted by CM1. Of the 37 acres of modeled habitat that would be



1 removed for the construction of the conveyance facilities, 23 acres would be a permanent loss  
2 and 14 acres would be a temporary loss of migratory habitat. Activities that would impact  
3 modeled habitat consist of tunnel, forebay, and intake construction, temporary access roads, and  
4 construction of transmission lines. Impacts from CM1 would occur in the central delta in CZ 3,  
5 CZ 4, CZ 5, CZ 6, and CZ 8. There are no extant occurrences of yellow-billed cuckoo nests in the  
6 study area. However, this loss would have the potential to displace individuals, if present, and  
7 remove the functions and value of modeled habitat for nesting, protection, or foraging. Refer to  
8 the Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.  
9 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.

- 10 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
11 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent  
12 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent  
13 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss  
14 is expected to occur during the first 10 years of Alternative 1A implementation. There are no  
15 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 16 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
17 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo  
18 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no  
19 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed  
20 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay  
21 Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road  
22 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for  
23 CM4.
- 24 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
25 seasonally inundated floodplain would permanently and temporarily remove approximately 11  
26 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres  
27 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of  
28 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately  
29 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally  
30 inundated floodplain restoration actions. The actual number of acres that would be restored  
31 may differ from these estimates, depending on how closely the outcome of seasonally inundated  
32 floodplain restoration approximates the assumed outcome. Once this restored riparian  
33 vegetation has developed habitat functions, a portion of it would be suitable to support western  
34 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for  
35 the cuckoo.
- 36 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
37 activities that could be implemented in protected western yellow-billed cuckoo habitats would  
38 maintain and improve the functions of the habitat over the term of the BDCP. With conditions  
39 favorable for its future establishment in the Plan Area, western yellow-billed cuckoo would be  
40 expected to benefit from the increase in protected habitat. However, habitat management- and  
41 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were  
42 present near work sites. *CM11 Natural Communities Enhancement and Management* actions  
43 designed to enhance wildlife values in restored riparian habitats may result in localized ground  
44 disturbances that could temporarily remove small amounts of western yellow-billed cuckoo  
45 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and  
46 other infrastructure maintenance activities, would be expected to have minor adverse effects on

1 available western yellow-billed cuckoo habitat and would be expected to result in overall  
2 improvements and maintenance of western yellow-billed cuckoo habitat values over the term of  
3 the BDCP.

- 4 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
5 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
6 Temporarily affected areas would be restored as riparian habitat within 1 year following  
7 completion of construction activities. Although the effects are considered temporary, the  
8 restored riparian habitat would require 5 years to several decades, for ecological succession to  
9 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
10 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
11 therefore, the replaced riparian vegetation would be expected to have structural components  
12 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
13 restoration activities are complete.
- 14 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
15 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
16 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.  
17 Maintenance activities would include vegetation management, levee and structure repair, and  
18 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
19 AMMs and conservation actions as described below.
- 20 ● Injury and Direct Mortality: Western yellow-billed cuckoo nesting has not been confirmed in the  
21 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in  
22 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
23 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding  
24 in the study area, or may nest there in the future. Construction-related activities would not be  
25 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they  
26 were present in the Plan Area, because they would be expected to avoid contact with  
27 construction and other equipment. If western yellow-billed cuckoo were to nest in the  
28 construction area, construction-related activities, including equipment operation, noise and  
29 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of  
30 eggs and nestlings. These effects would be avoided and minimized with the incorporation of  
31 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*  
32 *Cuckoo* into the BDCP.

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

### 36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
38 term BDCP conservation strategy has been evaluated to determine whether it would provide  
39 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
40 effects of construction would not be adverse under NEPA. The Plan would remove 432 acres of  
41 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would  
42 result from the construction of the water conveyance facilities (CM1, 37 acres of modeled migratory  
43 habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries Enhancement*,  
44 CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain Restoration*—

1 395 acres of modeled nesting and migratory habitat). These habitat losses would primarily consist  
2 of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value habitat for the  
3 species.

4 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
5 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
6 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
7 habitat. Using these ratios would indicate that 37 acres of valley/foothill riparian habitat should be  
8 restored/created and 37 acres should be protected to compensate for the CM1 losses of yellow-  
9 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
10 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
11 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
12 protection).

13 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
14 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
15 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
16 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
17 yellow-billed cuckoo. The majority of the riparian restoration acres would occur in CZ 7 as part of a  
18 reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
19 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals  
20 and objectives in the Plan for riparian restoration also include the restoration, maintenance and  
21 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among  
22 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and  
23 grasslands (Objective VFRNC2.1). These natural community biological goals and objectives would  
24 inform the near-term protection and restoration efforts and represent performance standards for  
25 considering the effectiveness of conservation actions for the species.

26 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
27 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
28 restored riparian habitat would require several years (early-mid successional) and several decades  
29 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to  
30 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
31 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP  
32 actions would not be expected to have an adverse population-level effect on the species. Overall,  
33 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
34 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
35 area.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
41 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
42 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
43 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
44 *Measures.*

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
3 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1A as a whole would result in  
4 the permanent loss of and temporary effects on 666 acres of modeled habitat (5% of the modeled  
5 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
6 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
7 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
8 would be in fragmented riparian habitat throughout the study area.

9 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
10 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
11 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
12 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
13 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
14 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
15 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
16 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
17 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
18 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
19 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
20 entirety the vegetative structure needed to support these species, because patch sizes may not be  
21 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
22 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
23 would expand the patches of existing riparian forest in order to support the species should they  
24 become established breeders in the study area.

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
26 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
27 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
29 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
30 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
33 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
34 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
35 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
36 *Measures*.

37 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 1A would  
38 represent an adverse effect in the absence of other conservation actions. However, the species is not  
39 an established breeder in the study area and current presence is limited to migrants. In addition, the  
40 habitat lost would consist of small, fragmented riparian stands that would not provide high-value  
41 habitat for the species. With habitat protection and restoration associated with CM3, CM7, and  
42 CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM22 Suisun Song*  
43 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in  
44 place throughout the construction period, the effects of habitat loss and potential mortality on  
45 western yellow-billed cuckoo would not be adverse under Alternative 1A.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
4 term BDCP conservation strategy has been evaluated to determine whether it would provide  
5 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
6 effects of construction would be less than significant under CEQA. The Plan would remove 432 acres  
7 of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would  
8 result from the construction of the water conveyance facilities (CM1, 37 acres of modeled migratory  
9 habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries Enhancement*,  
10 CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain Restoration*—  
11 395 acres of modeled nesting and migratory habitat). These habitat losses would primarily consist  
12 of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the  
13 species.

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
15 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
16 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
17 habitat. Using these ratios would indicate that 37 acres of valley/foothill riparian habitat should be  
18 restored/created and 37 acres should be protected to compensate for the CM1 losses of yellow-  
19 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
20 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
21 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
22 protection).

23 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
24 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
25 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
26 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
27 yellow-billed cuckoo. The majority of the riparian restoration acres would occur in CZ 7 as part of a  
28 reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
29 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals  
30 and objectives in the Plan for riparian restoration also include the restoration, maintenance and  
31 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among  
32 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and  
33 grasslands (Objective VFRNC2.1). These natural community biological goals and objectives would  
34 inform the near-term protection and restoration efforts and represent performance standards for  
35 considering the effectiveness of conservation actions for the species.

36 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
37 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
38 restored riparian habitat would require several years (early-mid successional) and several decades  
39 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to  
40 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
41 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP  
42 actions would not be expected to have an adverse population-level effect on the species. Overall,  
43 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed

1 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
2 area.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
4 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
5 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
8 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
9 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
10 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
11 *Measures.*

### 12 **Late Long-Term Timeframe**

13 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
14 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1A as a whole would result in  
15 the permanent loss of and temporary effects on 666 acres of modeled habitat (5% of the modeled  
16 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
17 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
18 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses  
19 would be in fragmented riparian habitat throughout the study area.

20 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
21 *and CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
22 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
23 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
24 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
25 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
26 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
27 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
28 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
29 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
30 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
31 entirety the vegetative structure needed to support these species, because patch sizes may not be  
32 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
33 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
34 would expand the patches of existing riparian forest in order to support the species should they  
35 become established breeders in the study area.

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
37 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
38 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
40 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
41 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
44 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would

1 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
2 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
3 *Measures*.

4 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
5 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
6 restoring habitats lost to construction and restoration activities, and implementation of AMM1–  
7 AMM7, and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
8 *Billed Cuckoo*, the loss of habitat or direct mortality through implementation of Alternative 1A would  
9 not result in a substantial adverse effect through habitat modifications and would not substantially  
10 reduce the number or restrict the range of the species. Therefore, the loss of habitat or potential  
11 mortality under this alternative would have a less-than-significant impact on western yellow-billed  
12 cuckoo.

### 13 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 14 **Constructing the Water Conveyance Facilities**

15 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance  
16 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.  
17 This could temporarily reduce the extent and functions supported by the affected habitat. Because  
18 western yellow-billed cuckoo is not currently present in the study area, and because the  
19 implementation of *CM5 Seasonally Inundated Floodplain Restoration* would protect and create  
20 contiguous high-value riparian habitat, any such habitat fragmentation is expected to have no or  
21 minimal effect on the species.

22 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed  
23 cuckoo. The habitat functions in the study area for the species would be greatly improved through  
24 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
25 habitat.

26 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western  
27 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly  
28 improved through the implementation of CM5, which would restore and protect large contiguous  
29 patches of riparian habitat.

### 30 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical** 31 **Transmission Facilities**

32 New transmission lines would increase the risk for bird-power line strikes, which could result in  
33 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses  
34 riparian forests to meet all of its breeding and wintering life requisites, the species remains  
35 primarily within the canopy of riparian forests and rarely ventures into open spaces except during  
36 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer  
37 resident, the species occurs in the study area during periods of relatively high visibility and clear  
38 weather conditions, thus further reducing collision risk from daily use patterns or seasonal  
39 migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by low wing  
40 loading and a moderate aspect ratio, making the species moderately maneuverable and presumably  
41 able to avoid collisions, especially during high-visibility conditions (BDCP Attachment 5J.C, *Analysis*  
42 *of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Transmission line poles and

1 towers also provide perching substrate for raptors, which could result in increased predation  
2 pressure on western yellow-billed cuckoo if they were to use habitat adjacent to lines.

3 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the  
4 study area, its proclivity to remain in the riparian canopy, its presence in the study area during  
5 periods of relative high visibility, and its overall ability to successfully negotiate around overhead  
6 wires that it may encounter. Transmission line poles and towers also provide perching substrate for  
7 raptors, which could result in increased predation pressure on western yellow-billed cuckoo. This  
8 would not be expected to have an adverse effect on the western yellow-billed cuckoo population.

9 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
10 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to  
11 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian  
12 canopy, its presence during periods of relative high visibility, and its overall ability to successfully  
13 negotiate around overhead wires that it may encounter. Transmission line poles and towers also  
14 provide perching substrate for raptors, which could result in increased predation pressure on  
15 western yellow-billed cuckoo. This would be expected to have a less-than-significant impact on the  
16 western yellow-billed cuckoo population.

### 17 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

18 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
19 with construction-related activities could result in temporary disturbances that affect western  
20 yellow-billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction  
21 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from  
22 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*  
23 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
24 available data to determine the extent to which these noise levels could affect western yellow-billed  
25 cuckoo. Indirect effects associated with construction include noise, dust, and visual disturbance  
26 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
27 footprint but within 1,300 feet from the construction edge. If western yellow-billed cuckoo were to  
28 nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
29 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
30 functions of suitable nesting habitat for these species. These potential effects would be minimized  
31 with incorporation of *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western*  
32 *Yellow-Billed Cuckoo* into the BDCP. The use of mechanical equipment during water conveyance  
33 facilities construction could cause the accidental release of petroleum or other contaminants that  
34 could affect western yellow-billed cuckoo in the surrounding habitat. The inadvertent discharge of  
35 sediment or excessive dust adjacent to western yellow-billed cuckoo habitat could also affect the  
36 species. AMM1-AMM7, including *AMM2 Construction BMPs and Monitoring*, in addition to *AMM22*  
37 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* would  
38 minimize the likelihood of such spills and ensure that measures were in place to prevent runoff from  
39 the construction area and any adverse effects of dust on active nests.

40 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 1A  
41 implementation could have adverse effects on the species through the modification of habitat and  
42 potential for direct mortality. However, due to the species' minimal presence in the study area, and  
43 with the incorporation of AMM1-AMM7 and *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*,



1 *Least Bell's Vireo, Western Yellow-Billed Cuckoo* into the BDCP, indirect effects would not have an  
2 adverse effect on western yellow-billed cuckoo.

3 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 1A  
4 implementation could have a significant impact on the species from modification of habitat. With the  
5 incorporation of AMM1–AMM7 and AMM23 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
6 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, indirect effects as a result of Alternative 1A  
7 implementation would have a less-than-significant impact on western yellow-billed cuckoo.

### 8 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a** 9 **Result of Implementation of Conservation Components**

10 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
11 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo  
12 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased  
13 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the  
14 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian  
15 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and  
16 changes to frequency and inundation would be within the tolerance of these vegetation types.

17 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
18 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding  
19 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect  
20 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside  
21 the period the floodplains would likely be inundated, and periodic inundation of floodplains is  
22 expected to restore a more natural flood regime in support of riparian vegetation types that provide  
23 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal  
24 inundation in existing riparian natural communities is likely to be beneficial for western yellow-  
25 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological  
26 processes in riparian areas, and flooding promotes the germination and establishment of many  
27 native riparian plants.

28 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if  
29 they were to establish as breeders in the study area, because flooding is expected to occur outside of  
30 the breeding season.

31 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on  
32 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is  
33 expected to occur outside of the breeding season.

### 34 **White-Tailed Kite**

35 This section describes the effects of Alternative 1A, including water conveyance facilities  
36 construction and implementation of other conservation components, on white-tailed kite. The  
37 habitat model used to assess impacts on white-tailed kite includes nesting habitat and foraging  
38 habitat. Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian  
39 forests, valley oak woodlands, or other groups of trees and are usually associated with compatible  
40 foraging habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996).  
41 Modeled foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and

1 grain crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen  
2 1995).

3 Construction and restoration associated with Alternative 1A conservation measures would result in  
4 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-  
5 1A-41. The majority of the losses would take place over an extended period of time as tidal marsh is  
6 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be  
7 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)  
8 for restored habitats to replace the functions of habitat lost. This time lag between impacts and  
9 restoration of habitat function would be minimized by specific requirements of *AMM18 Swainson's*  
10 *Hawk and White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
11 implementation of Alternative 1A would also include the following biological objectives over the  
12 term of the BDCP to benefit the white-tailed kite (BDCP Chapter 3, *Conservation Strategy*).

- 13 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
14 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
15 associated with CM7).
- 16 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
17 10 (Objective VFRNC1.2, associated with CM3).
- 18 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
19 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
20 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 21 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 22 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
23 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 24 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
25 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 26 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
27 VPNC2.5, and GNC2.4, associated with CM11).
- 28 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
29 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 30 • Plant and maintain native trees along roadsides and field borders within protected cultivated  
31 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 32 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
33 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
34 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
35 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 36 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
37 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11)

38 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
39 management activities that would enhance these natural communities for the species and  
40 implementation of AMM1–AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, impacts on

1 white-tailed kite would not be adverse for NEPA purposes and would be less than significant for  
2 CEQA purposes.

3 **Table 12-1A-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 1A**  
4 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	29	29	20	20	NA	NA
	Foraging	3,299	3,299	1,432	1,432	NA	NA
<b>Total Impacts CM1</b>		<b>3,328</b>	<b>3,328</b>	<b>1,452</b>	<b>1,452</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	312	507	88	121	48–82	230
	Foraging	8,723	52,675	516	1,484	3,030–6,651	7,402
<b>Total Impacts CM2–CM18</b>		<b>9,035</b>	<b>53,182</b>	<b>604</b>	<b>1,605</b>	<b>3,078–6,733</b>	<b>7,632</b>
<b>Total Nesting</b>		<b>341</b>	<b>536</b>	<b>108</b>	<b>141</b>	48–82	230
<b>Total Foraging</b>		<b>12,022</b>	<b>55,974</b>	<b>1,948</b>	<b>2,916</b>	3,030–6,651	7,402
<b>TOTAL IMPACTS</b>		<b>12,363</b>	<b>56,510</b>	<b>2,056</b>	<b>3,057</b>	<b>3,078–6,733</b>	<b>7,632</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

5

6 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

7 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
8 of up to 59,567 acres of modeled habitat (677 acres of nesting habitat and 58,890 acres of foraging  
9 habitat) for white-tailed kite (Table 12-1A-41). Conservation measures that would result in these  
10 losses are conveyance facilities and transmission line construction, and establishment and use of  
11 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
12 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),  
13 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
14 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
15 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
16 In addition, maintenance activities associated with the long-term operation of the water conveyance  
17 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of  
18 these individual activities is described below. A summary statement of the combined impacts and  
19 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 1       • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 1A water  
2 conveyance facilities would result in the combined permanent and temporary loss of up to 49  
3 acres of white-tailed kite nesting habitat (29 acres of permanent loss and 20 acres of temporary  
4 loss). In addition, 4,731 acres of foraging habitat would be removed (3,299 acres of permanent  
5 loss, 1,432 acres of temporary loss). (Table 12-1A-41). Activities that would impact modeled  
6 White-tailed kite habitat consist of tunnel, forebay, and intake construction, temporary access  
7 roads, and construction of transmission lines. Most of the permanent loss of nesting habitat  
8 would occur where Intakes 1–5 impact the Sacramento River’s east bank between Freeport and  
9 Courtland. The riparian areas here are very small patches, some dominated by valley oak and  
10 others by nonnative trees. Temporary losses of nesting habitat would occur where pipelines  
11 cross Snodgrass Slough and other small waterways east of the Sacramento River, and where  
12 temporary work areas surround intake sites. The riparian habitat in these areas is also  
13 composed of very small patches or stringers bordering waterways, which are composed of  
14 valley oak and scrub vegetation. There are no occurrences of nesting white-tailed kite that  
15 overlap with the construction footprint of CM1. However, the implementation of *AMM18*  
16 *Swainson’s Hawk and White-Tailed Kite* would minimize effects on white-tailed kites if they were  
17 to nest within or adjacent to the construction footprint. Impacts on white-tailed kite foraging  
18 habitat would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. Refer to the  
19 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.  
20 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.
- 21       • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
22 would result in the combined permanent and temporary loss of up to 170 acres of nesting  
23 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
24 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516  
25 acres of temporary loss). Activities through CM2 could involve excavation and grading in  
26 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
27 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
28 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
29 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur  
30 during the first 10 years of Alternative 1A implementation.
- 31       • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation  
32 and inundation would permanently remove an estimated 383 acres of white-tailed kite nesting  
33 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of  
34 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
35 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
36 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
37 directly impact and fragment grassland just north of Rio Vista in and around French and  
38 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
39 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
40 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over  
41 fairly broad areas within the tidal restoration footprints could result in the removal or  
42 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees  
43 would not be actively removed but tree mortality would be expected over time as areas became  
44 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the  
45 local nesting population.

- 1       • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
2       seasonally inundated floodplain and riparian restoration actions would remove approximately  
3       75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary  
4       loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary  
5       loss). These losses would be expected after the first 10 years of Alternative 1A implementation  
6       along the San Joaquin River and other major waterways in CZ 7.
- 7       • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
8       approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and  
9       3,991 acres as part of seasonal floodplain restoration through CM7.
- 10      • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
11      implemented on agricultural lands and would result in the conversion of 1,849 acres of white-  
12      tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.  
13      If agricultural lands supporting higher value foraging habitat than the restored grassland were  
14      removed, there would be a loss of white-tailed kite foraging habitat value.
- 15      • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
16      result in the permanent conversion of 1,440 acres of cultivated lands to nontidal marsh in CZ 2  
17      and CZ 4. This would not result in a loss of foraging habitat as both natural communities are  
18      foraging habitat for white-tailed kite. Small patches of riparian vegetation that support White-  
19      tailed kite nesting habitat may develop along the margins of restored nontidal marsh restoration  
20      would also provide foraging habitat for the species.
- 21      • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
22      enhancement-related activities could disturb white-tailed kite nests if they were present near  
23      work sites. A variety of habitat management actions that are designed to enhance wildlife values  
24      in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
25      remove small amounts of white-tailed kite habitat and reduce the functions of habitat until  
26      restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation  
27      and road and other infrastructure maintenance, are expected to have minor effects on available  
28      white-tailed kite habitat and are expected to result in overall improvements to and maintenance  
29      of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected  
30      to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also  
31      include the construction of recreational-related facilities including trails, interpretive signs, and  
32      picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
33      construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
34      placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
35      of white-tailed kite grassland foraging habitat would be lost from the construction of trails and  
36      facilities.
- 37      • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
38      white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation  
39      hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.
- 40      Permanent and temporary white-tailed kite nesting habitat losses from the above conservation  
41      measures, would primarily consist of small, fragmented riparian stands. Temporarily affected  
42      nesting habitat would be restored as riparian habitat within 1 year following completion of  
43      construction activities. The restored riparian habitat would require 1 to several decades to  
44      functionally replace habitat that has been affected and for trees to attain sufficient size and  
45      structure suitable for nesting by white-tailed kite. *AMM18 Swainson's Hawk and White-Tailed*

1           *Kite* contains actions described below to reduce the effect of temporal loss of nesting habitat,  
2 including the transplanting of mature trees and planting of trees near high-value foraging  
3 habitat. The functions of agricultural and grassland communities that provide foraging habitat  
4 for white-tailed kite are expected to be restored relatively quickly.

- 5           ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
6 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
7 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance  
8 activities would include vegetation management, levee and structure repair, and re-grading of  
9 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7  
10 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
11 described below.
- 12           ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
13 direct mortality of adult or fledged white-tailed kite if they were present in the Plan Area,  
14 because they would be expected to avoid contact with construction and other equipment.  
15 However, if white-tailed kite were to nest in the construction area, construction-related  
16 activities, including equipment operation, noise and visual disturbances could affect nests or  
17 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
18 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
19 *Tailed Kite* into the BDCP.

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

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

24           Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
27 the effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338  
28 acres of permanent loss, 111 acres of temporary loss) of white-tailed kite nesting habitat in the  
29 study area in the near-term. These effects would result from the construction of the water  
30 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*  
31 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
32 *Inundated Floodplain Restoration*—400 acres). In addition, 14,873 acres of white-tailed kite foraging  
33 habitat would be removed or converted in the near-term (CM1, 5,634 acres; *CM2 Yolo Bypass*  
34 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally Inundated*  
35 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
36 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*  
37 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239  
38 acres).

39           Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
40 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
41 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
42 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 49  
43 acres of nesting habitat should be restored/ created and 49 acres should be protected to mitigate  
44 the CM1 losses of white-tailed kite nesting habitat. In addition, 5,634 acres of foraging habitat

1 should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The  
2 near-term effects of other conservation actions would remove 400 acres of modeled nesting habitat,  
3 and therefore require 400 acres of restoration and 400 acres of protection of nesting habitat.  
4 Similarly, the near-term effects of other conservation actions would result in the loss or conversion  
5 of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of protection of  
6 foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
7 protection of nesting habitat; 1:1 for protection of foraging habitat).

8 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
9 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
11 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
12 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
13 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
14 actions are associated with CM3, CM4, CM7, and CM8 and would occur in the same timeframe as the  
15 construction and early restoration losses.

16 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
17 system with extensive wide bands or large patches of valley/foothill riparian natural community  
18 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
19 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
20 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
21 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
22 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
23 would be increased by planting and maintaining native trees along roadsides and field borders  
24 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
25 small but essential nesting habitat associated with cultivated lands would also be maintained and  
26 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
27 farmyards or at rural residences (Objective CLNC1.3).

28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
29 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
30 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
31 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
32 would provide foraging habitat for white-tailed kite and reduce the effects of current levels of  
33 habitat fragmentation. Small mammal populations would also be increased on protected lands,  
34 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
35 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through  
36 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within  
37 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other  
38 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve  
39 system which would provide additional foraging habitat and a source of rodent prey that could  
40 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including  
41 upland grassland components) that dry during the spring would also serve as foraging habitat for  
42 white-tailed kite as prey species recolonize the fields (Objective MWNC1.1). In addition, the  
43 restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
44 provide high-value foraging habitat for the white-tailed kite. At least 15,400 acres of cultivated lands  
45 that provide habitat for covered and other native wildlife species would be protected in the near-  
46 term time period (Objective CLNC1.1). These biological goals and objectives would inform the near-

1 term protection and restoration efforts and represent performance standards for considering the  
2 effectiveness of restoration actions. The acres of restoration and protection contained in the near-  
3 term Plan goals and the additional detail in the biological objectives satisfy the typical mitigation  
4 that would be applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well  
5 as mitigate the near-term effects of the other conservation measures.

6 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
7 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
8 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
9 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
10 require one to several decades to functionally replace habitat that has been affected and for trees to  
11 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
12 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
13 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
14 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
15 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
16 would further reduce this limited resource and could reduce or restrict the number of active white-  
17 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

18 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
19 trees, including transplanting trees scheduled for removal. These would be supplemented with  
20 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
21 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
22 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
23 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
24 term period. A variety of native tree species would be planted to provide trees with differing growth  
25 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in areas  
26 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
27 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
28 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
29 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
30 single region of the Plan Area, but would be distributed throughout the lands protected as foraging  
31 habitat for white-tailed kite. With this program in place, Alternative 1A would not have a substantial  
32 adverse effect on white-tailed kite in the near-term timeframe, either through direct mortality or  
33 through habitat modifications.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
35 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
36 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
39 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
40 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

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

42 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres  
43 of modeled foraging habitat for white-tailed kite. Alternative 1A as a whole would result in the  
44 permanent loss of and temporary effects on 677 acres of potential nesting habitat (5% of the



1 potential nesting habitat in the study area) and the loss or conversion of 59,793 acres of foraging  
2 habitat (12% of the foraging habitat in the study area). The locations of these losses are described  
3 above in the analyses of individual conservation measures.

4 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
5 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
6 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*  
7 *Restoration*, to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
8 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
9 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
10 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that  
11 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal  
12 wetlands (Table 3-4 in Chapter 3).

13 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
14 system with extensive wide bands or large patches of valley/foothill riparian natural community  
15 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
16 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
17 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
18 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
19 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
20 would be increased by planting and maintaining native trees along roadsides and field borders  
21 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
22 small but essential nesting habitat associated with cultivated lands would also be maintained and  
23 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
24 farmyards or at rural residences (Objective CLNC1.3).

25 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
26 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
27 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
28 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
29 would provide foraging habitat for white-tailed kite and reduce the effects of current levels of  
30 habitat fragmentation. Small mammal populations would also be increased on protected lands,  
31 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
32 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through  
33 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within  
34 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other  
35 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve  
36 system which would provide additional foraging habitat and a source of rodent prey that could  
37 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including  
38 upland grassland components) that dry during the spring would also serve as foraging habitat for  
39 white-tailed kite as prey species recolonize the fields (Objective MWNC1.1). In addition, the  
40 restoration of at least 65,000 acres of tidal natural communities, including transitional uplands  
41 would provide high-value foraging habitat for the white-tailed kite. At least 45,405 acres of  
42 cultivated lands that provide foraging habitat for white-tailed kite would be protected by the late  
43 long-term time period (Objective CLNC1.1).

44 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
45 *Plant Species*) estimates that the restoration and protection actions discussed above could result in

1 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
2 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

10 **NEPA Effects:** The loss of white-tailed kite habitat and potential for direct mortality of this special-  
11 status species under Alternative 1A would represent an adverse effect in the absence of other  
12 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
13 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM18*  
14 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
15 the effects of habitat loss and potential mortality on white-tailed kite under Alternative 1A would  
16 not be adverse.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
20 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
21 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
22 the effect of construction would be less than significant under CEQA. The Plan would remove 449  
23 acres (338 acres of permanent loss, 111 acres of temporary loss) of white-tailed kite nesting habitat  
24 in the study area in the near-term. These effects would result from the construction of the water  
25 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*  
26 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
27 *Inundated Floodplain Restoration—400 acres*). In addition, 14,873 acres of white-tailed kite foraging  
28 habitat would be removed or converted in the near-term (CM1, 5,634 acres; *CM2 Yolo Bypass*  
29 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
30 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
31 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*  
32 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries—9,239*  
33 acres).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
35 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
36 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
37 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 49  
38 acres of nesting habitat should be restored/ created and 49 acres should be protected to mitigate  
39 the CM1 losses of white-tailed kite nesting habitat. In addition, 5,634 acres of foraging habitat  
40 should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The  
41 near-term effects of other conservation actions would remove 400 acres of modeled nesting habitat,  
42 and therefore require 400 acres of restoration and 400 acres of protection of nesting habitat.  
43 Similarly, the near-term effects of other conservation actions would result in the loss or conversion  
44 of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of protection of

1 foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
2 protection of nesting habitat; 1:1 for protection of foraging habitat).

3 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
4 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
5 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
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8 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
9 actions are associated with CM3, CM4, CM7, and CM8 and would occur in the same timeframe as the  
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14 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
15 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
16 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
17 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
18 would be increased by planting and maintaining native trees along roadsides and field borders  
19 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
20 small but essential nesting habitat associated with cultivated lands would also be maintained and  
21 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
22 farmyards or at rural residences (Objective CLNC1.3).

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26 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
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28 habitat fragmentation. Small mammal populations would also be increased on protected lands,  
29 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
30 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through  
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34 system which would provide additional foraging habitat and a source of rodent prey that could  
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36 upland grassland components) that dry during the spring would also serve as foraging habitat for  
37 white-tailed kite as prey species recolonize the fields (Objective MWNC1.1). In addition, the  
38 restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
39 provide high-value foraging habitat for the white-tailed kite. At least 15,400 acres of cultivated lands  
40 that provide habitat for covered and other native wildlife species would be protected in the near-  
41 term time period (Objective CLNC1.1). These biological goals and objectives would inform the near-  
42 term protection and restoration efforts and represent performance standards for considering the  
43 effectiveness of restoration actions. The acres of restoration and protection contained in the near-  
44 term Plan goals and the additional detail in the biological objectives satisfy the typical mitigation  
45 that would be applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well  
46 as mitigate the near-term effects of the other conservation measures.

1 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
2 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
3 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
4 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
5 require one to several decades to functionally replace habitat that has been affected and for trees to  
6 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
7 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
8 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
9 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
10 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
11 would further reduce this limited resource and could reduce or restrict the number of active white-  
12 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

13 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
14 trees, including transplanting trees scheduled for removal. These would be supplemented with  
15 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
16 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
17 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
18 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
19 term period. A variety of native tree species would be planted to provide trees with differing growth  
20 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in areas  
21 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
22 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
23 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
24 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
25 single region of the Plan Area, but would be distributed throughout the lands protected as foraging  
26 habitat for white-tailed kite. With this program in place, Alternative 1A would not have a substantial  
27 adverse effect on white-tailed kite in the near-term timeframe, either through direct mortality or  
28 through habitat modifications.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
34 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
35 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 36 **Late Long-Term Timeframe**

37 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres  
38 of modeled foraging habitat for white-tailed kite. Alternative 1A as a whole would result in the  
39 permanent loss of and temporary effects on 677 acres of potential nesting habitat (5% of the  
40 potential nesting habitat in the study area) and the loss or conversion of 59,793 acres of foraging  
41 habitat (12% of the foraging habitat in the study area).

42 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
43 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
44 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*

1 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
2 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
3 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
4 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that  
5 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal  
6 wetlands (Table 3-4 in Chapter 3).

7 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
8 system with extensive wide bands or large patches of valley/foothill riparian natural community  
9 (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*). Riparian restoration  
10 would expand the patches of existing riparian forest in order to support nesting habitat for the  
11 species. White-tailed kite is excluded from narrow bands of riparian vegetation by Swainson's  
12 hawks and therefore requires wide patches of nesting habitat where its range overlaps with  
13 Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees would be  
14 increased by planting and maintaining native trees along roadsides and field borders within  
15 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
16 but essential nesting habitat associated with cultivated lands would also be maintained and  
17 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
18 farmyards or at rural residences (Objective CLNC1.3).

19 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
20 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
21 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
22 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
23 would provide foraging habitat for white-tailed kite and reduce the effects of current levels of  
24 habitat fragmentation. Small mammal populations would also be increased on protected lands,  
25 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
26 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through  
27 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within  
28 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other  
29 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve  
30 system which would provide additional foraging habitat and a source of rodent prey that could  
31 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including  
32 upland grassland components) that dry during the spring would also serve as foraging habitat for  
33 white-tailed kite as prey species recolonize the fields (Objective MWNC1.1). In addition, the  
34 restoration of at least 65,000 acres of tidal natural communities, including transitional uplands  
35 would provide high-value foraging habitat for the white-tailed kite. At least 45,405 acres of  
36 cultivated lands that provide foraging habitat for white-tailed kite would be protected by the late  
37 long-term time period (Objective CLNC1.1).

38 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
39 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
40 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
41 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
43 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
44 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
45 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

4 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
5 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
6 restoring riparian and foraging habitats lost to construction and restoration activities, and  
7 implementation of AMM1–AMM7, and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
8 habitat or direct mortality through implementation of Alternative 1A would not result in a  
9 substantial adverse effect through habitat modifications and would not substantially reduce the  
10 number or restrict the range of the species. In particular, 95% of the loss of foraging habitat effects  
11 involve the conversion from one habitat type to another form of suitable foraging habitat. Therefore,  
12 the loss of habitat or potential mortality under this alternative would have a less-than-significant  
13 impact on white-tailed kite.

#### 14 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 15 **Facilities**

16 New transmission lines would increase the risk that white-tailed kites could be subject to power line  
17 strikes and/or electrocution, which could result in injury or mortality of individuals. This species  
18 would be at low risk of bird strike mortality based on its general maneuverability, its keen eyesight,  
19 and lack of flocking behavior (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*  
20 *BDCP Transmission Lines*). *AMM20 Greater Sandhill Crane*, would further reduce any potential  
21 effects.

22 **NEPA Effects:** New transmission lines would minimally increase the risk for white-tailed kite power  
23 line strikes. However, the species would be at a low risk of bird strike mortality based on its general  
24 maneuverability, its keen eyesight and lack of flocking behavior. With the implementation of *AMM20*  
25 *Greater Sandhill Crane* the potential effect of the construction of new transmission lines on white-  
26 tailed kite would not be adverse.

27 **CEQA Conclusion:** New transmission lines would increase the risk for white-tailed kite power line  
28 strikes and/or electrocution. However, the species would be at a low risk of bird strike mortality  
29 based on its general maneuverability, its keen eyesight and lack of flocking behavior. *AMM20 Greater*  
30 *Sandhill Crane* would further reduce any potential impact of the construction of new transmission  
31 lines on white-tailed kite to a less-than-significant level.

#### 32 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

33 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be  
34 indirectly affected by construction activities. Construction noise above background noise levels  
35 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
36 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
37 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
38 which these noise levels could affect white-tailed kite. Indirect effects associated with construction  
39 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
40 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.  
41 If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent  
42 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
43 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM18 Swainson's*

1 *Hawk and White-Tailed Kite* would require preconstruction surveys, and if detected, 200 yard no  
2 disturbance buffers would be established around active nests. The use of mechanical equipment  
3 during water conveyance facilities construction could cause the accidental release of petroleum or  
4 other contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent  
5 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the  
6 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
7 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
8 from the construction area and negative effects of dust on active nests.

9 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
10 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain  
11 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
12 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
13 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
14 restoration activities that create newly inundated areas could increase bioavailability of mercury  
15 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
16 associated with natural community and floodplain restoration may indirectly affect white-tailed kite  
17 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of  
18 methylmercury within the study area varies with site-specific conditions and would need to be  
19 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
20 specific Mercury Management Plans. Site-specific restoration plans that address the creation and  
21 mobilization of mercury, as well as monitoring and adaptive management as described in CM12  
22 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and  
23 potential impacts on white-tailed kite.

24 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
25 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
26 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
27 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
28 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
29 classes within a species. In addition, the effect of selenium on a species can be confounded by  
30 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
31 2009).

32 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
33 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
34 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
35 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
36 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
37 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
38 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
39 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
40 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
41 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
42 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
43 levels of selenium have a higher risk of selenium toxicity.

44 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
45 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to

1 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal  
2 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
3 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
4 restoration activities that create newly inundated areas could increase bioavailability of selenium  
5 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
6 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
7 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
8 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
9 difficult to determine whether the effects of potential increases in selenium bioavailability  
10 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse  
11 effects on white-tailed kite.

12 Because of the uncertainty that exists at this programmatic level of review, there could be a  
13 substantial effect on white-tailed kite from increases in selenium associated with restoration  
14 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
15 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
16 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
17 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
18 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
19 separately for each restoration effort as part of design and implementation. This avoidance and  
20 minimization measure would be implemented as part of the tidal habitat restoration design  
21 schedule.

22 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
23 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation  
24 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
25 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the  
26 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and  
27 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative  
28 1A would not have an adverse effect on white-tailed kite with the implementation of *AMM1–AMM7*,  
29 and *AMM18 Swainson's Hawk and White-Tailed Kite*. Tidal habitat restoration could result in  
30 increased exposure of white-tailed kite to selenium. This effect would be addressed through the  
31 implementation of *AMM27, Selenium Management* which would provide specific tidal habitat  
32 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
33 bioavailability in tidal habitats. The indirect effects associated with noise and visual disturbances,  
34 potential spills of hazardous material, and increased exposure to selenium from Alternative 1A  
35 implementation would not have an adverse effect on white-tailed kite. Tidal habitat restoration is  
36 unlikely to have an adverse effect on white-tailed kite through increased exposure to  
37 methylmercury, as kites currently forage in tidal marshes where elevated methylmercury levels  
38 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
39 the potential for increased exposure varies substantially within the study area. Site-specific  
40 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
41 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
42 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
43 assess the potential for risk of methylmercury exposure for white-tailed kite, once site specific  
44 sampling and other information could be developed.

45 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
46 operations and maintenance of the water conveyance facilities under Alternative 1A would have a



1 less-than-significant impact on white-tailed kite with the implementation of *AMM18 Swainson's*  
2 *Hawk and White-Tailed Kite*, and AMMs 1–7. Tidal habitat restoration could result in increased  
3 exposure of white-tailed kite to selenium. This effect would be addressed through the  
4 implementation of *AMM27, Selenium Management* which would provide specific tidal habitat  
5 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
6 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
7 floodplain restoration could result in increased exposure of white-tailed kite to methylmercury.  
8 However, it is unknown what concentrations of methylmercury are harmful to this species. *CM12*  
9 *Methylmercury Management* includes provisions for project-specific Mercury Management Plans.  
10 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
11 monitoring and adaptive management as described in *CM12*, would better inform potential impacts  
12 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area on  
13 white-tailed kite. With these measures in place, the indirect effects associated with noise and visual  
14 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
15 Alternative 1A implementation would have a less-than-significant impact on white-tailed kite.

16 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**  
17 **Implementation of Conservation Components**

18 Flooding of the Yolo Bypass from Fremont Weir operations related to *CM2 Yolo Bypass Fisheries*  
19 *Enhancement* would increase the frequency and duration of inundation on approximately 48–82  
20 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed  
21 kite foraging habitat (Table 12-1A-41). During inundation years, affected cultivated lands and  
22 grassland would not be available as foraging habitat until prey populations have re-inhabited  
23 inundated areas. This would result in temporary periodic reduction in availability of foraging  
24 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,  
25 there could be a further loss of foraging habitat value if the crop type that would have been planted  
26 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite  
27 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse  
28 effect on nest sites that may be within the inundation area because existing trees already withstand  
29 floods in the area, the increase in inundation frequency and duration is expected to remain within  
30 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

31 Based on hypothetical floodplain restoration, *CM5* implementation could result in periodic  
32 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402  
33 acres of modeled white-tailed kite foraging habitat (Table 12-1A-41). Inundation of foraging habitat  
34 could result in a periodic reduction of available foraging habitat due to the reduction in available  
35 prey. Following draw-down, inundated habitats are expected to recover and provide suitable  
36 foraging conditions until the following inundation period. Thus, this is considered a periodic impact  
37 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the Plan  
38 Area.

39 Periodic inundation of floodplains (through *CM2* and *CM5*) would be expected to restore a more  
40 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting  
41 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because  
42 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

1 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite  
2 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
3 draw-down. Any effects are considered short-term and would not result in an adverse effect.

4 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite  
5 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
6 draw-down. Any effects are considered short-term and would be expected to have a less-than-  
7 significant impact on white-tailed kite.

## 8 **Yellow-Breasted Chat**

9 This section describes the effects of Alternative 1A, including water conveyance facilities  
10 construction and implementation of other conservation components, on yellow-breasted chat.  
11 Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant  
12 alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an  
13 overstory component. Primary nesting and migratory habitat is qualitatively distinguished from  
14 secondary habitat in Delta areas as those plant associations that support a greater percentage of a  
15 suitable shrub cover, particularly blackberry, and California wild rose, and have an open to  
16 moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No  
17 distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats  
18 because supporting information is lacking. For this reason, the effects analysis only provides the  
19 breakdown between primary and secondary habitat in the habitat loss totals and associated tables,  
20 and does not provide this breakdown in the text by activity or effect type.

21 Construction and restoration associated with Alternative 1A conservation measures would result in  
22 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table  
23 12-1A-42. Full implementation of Alternative 1A would also include the following conservation  
24 actions over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,  
25 *Biological Goals and Objectives*).

- 26 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
27 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
28 associated with CM7).
- 29 ● Protect at least 750 acres of existing valley/foothill riparian natural community in C Z7 by year  
30 10 (Objective VFRNC1.2, associated with CM3).
- 31 ● Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
32 overlap among vegetation components and over adjacent riverine channels, freshwater  
33 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 34 ● Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed  
35 understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,  
36 associated with CM7).

37 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
38 management activities that would enhance these natural communities for the species and  
39 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*  
40 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for  
41 NEPA purposes and would be less than significant for CEQA purposes.

1  
2

**Table 12-1A-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	<i>Primary</i>	20	20	5	5	NA	NA
	<i>Secondary</i>	10	10	12	12	NA	NA
	<i>Suisun Marsh/Upper Yolo Bypass</i>	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>30</b>	<b>30</b>	<b>17</b>	<b>17</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	<i>Primary</i>	96	214	58	73	19-38	92
	<i>Secondary</i>	209	357	0	6	6-18	56
	<i>Suisun Marsh/Upper Yolo Bypass</i>	76	85	29	29	23-32	0
<b>Total Impacts CM2-CM18</b>		<b>381</b>	<b>656</b>	<b>87</b>	<b>108</b>	<b>48-88</b>	<b>148</b>
<b>Total Primary</b>		<b>116</b>	<b>234</b>	<b>63</b>	<b>78</b>	19-38	92
<b>Total Secondary</b>		<b>219</b>	<b>367</b>	<b>12</b>	<b>18</b>	6-18	56
<b>Total Suisun Marsh/Upper Yolo Bypass</b>		76	85	29	29	23-32	0
<b>TOTAL IMPACTS</b>		<b>411</b>	<b>686</b>	<b>104</b>	<b>125</b>	<b>48-88</b>	<b>148</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**  
5 **Chat**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 811 acres of modeled nesting and migratory habitat for yellow-breasted chat (686 acres of  
8 permanent loss, 125 acres of temporary loss, Table 12-1A-42). Conservation measures that would  
9 result in these losses are conveyance facilities and transmission line construction, and establishment  
10 and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal  
11 habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
12 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,  
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the

1 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
2 degrade or eliminate yellow-breasted chat habitat. Each of these individual activities is described  
3 below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion  
4 follow the individual conservation measure discussions.

- 5 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
6 result in the combined permanent and temporary loss of up to 25 acres of primary habitat (20  
7 acres of permanent loss, 5 acres of temporary loss). In addition, 22 acres of secondary habitat  
8 would be removed (10 acres of permanent loss, 12 acres of temporary loss, (Table 12-1A-42).  
9 Activities that would impact modeled habitat consist of tunnel, forebay, and intake construction,  
10 temporary access roads, and construction of transmission lines. Impacts from CM1 would occur  
11 in the central delta in CZs 3- 6, and 8. This loss would have the potential to displace individuals,  
12 if present, and remove the functions and value of modeled habitat for resting, protection, or  
13 foraging. There are no occurrences of yellow-breasted chat that overlap with the CM1  
14 construction footprint. The implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted*  
15 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would minimize effects on yellow-breasted  
16 chat if they were to nest within or adjacent to the construction footprint. Refer to the Terrestrial  
17 Biology Map Book for a detailed view of Alternative 1A construction locations. Impacts from  
18 CM1 would occur within the first 10 years of Alternative 1A implementation.
- 19 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction would permanently remove  
20 approximately 83 acres and temporarily remove 88 acres of yellow-breasted chat habitat in the  
21 Yolo Bypass in CZ 2. The loss is expected to occur during the first 10 years of Alternative 1A  
22 implementation.
- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
24 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat  
25 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting  
26 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of  
27 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.
- 28 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
29 seasonally inundated floodplain would permanently and temporarily remove approximately 49  
30 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of  
31 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.  
32 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of  
33 valley/foothill riparian habitat would be restored as a component of seasonally inundated  
34 floodplain restoration actions. The actual number of acres that would be restored may differ  
35 from these estimates, depending on how closely the outcome of seasonally inundated floodplain  
36 restoration approximates the assumed outcome. Once this restored riparian vegetation has  
37 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat  
38 habitat.
- 39 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
40 activities that could be implemented in protected yellow-breasted chat habitats would be  
41 expected to maintain and improve the functions of the habitat over the term of the BDCP.  
42 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which  
43 would maintain conditions favorable for the chat's use of the Plan Area.

44 Habitat management- and enhancement-related activities could disturb yellow-breasted chat  
45 nests if they are present near work sites. Equipment operation could destroy nests, and noise

1 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and  
2 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
3 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-  
4 breasted chat or other adverse effects.

5 Occupied habitat would be monitored to determine if there is a need to implement controls on  
6 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions  
7 would be expected to benefit the yellow-breasted chat by removing a potential stressor that  
8 could, if not addressed, adversely affect the stability of newly established populations.

9 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
10 *and Management* that are designed to enhance wildlife values in restored riparian habitats may  
11 result in localized ground disturbances that could temporarily remove small amounts of yellow-  
12 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
13 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
14 on available yellow-breasted chat habitat and are expected to result in overall improvements to  
15 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 16 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
17 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
18 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding  
19 habitat. Maintenance activities would include vegetation management, levee and structure  
20 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
21 reduced by AMMs and conservation actions as described below.
- 22 ● Injury and Direct Mortality: Construction is not expected to result in direct mortality of yellow-  
23 breasted chat because adults and fledged young are expected to occur only in very small  
24 numbers and, if present, would avoid contact with construction and other equipment. If yellow-  
25 breasted chat were to nest in the vicinity of construction activities, equipment operation could  
26 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*  
27 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid  
28 and minimize this effect.
- 29 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
30 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
31 Temporarily affected areas would be restored as riparian habitat within 1 year following  
32 completion of construction activities. Although the effects are considered temporary, the  
33 restored riparian habitat would require 5 years to several decades, for ecological succession to  
34 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
35 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
36 therefore, the replaced riparian vegetation would be expected to have structural components  
37 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
38 restoration activities are complete.

39 The following paragraphs summarize the combined effects discussed above and describe other  
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
41 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
3 term BDCP conservation strategy has been evaluated to determine whether it would provide  
4 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. The Plan would remove 515 acres of  
6 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would  
7 result from the construction of the water conveyance facilities (CM1, 47 acres of modeled nesting  
8 and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*  
9 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*  
10 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would  
11 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value  
12 habitat for the species.

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
14 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
15 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
16 habitat. Using these ratios would indicate that 47 acres of valley/foothill riparian habitat should be  
17 restored/created and 47 acres should be protected to compensate for the CM1 losses of yellow-  
18 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
19 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
20 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
21 protection).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
23 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
24 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
25 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
26 yellow-breasted chat. The majority of the riparian restoration acres would occur in CZ 7 as part of a  
27 reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
28 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals  
29 and objectives in the Plan for riparian restoration also include the restoration, maintenance and  
30 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among  
31 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and  
32 grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural habitat  
33 requirements, so only the early- to mid-successional portions of the restored and protected riparian  
34 natural would be expected to provide suitable habitat characteristics for the species. These natural  
35 community biological goals and objectives would inform the near-term protection and restoration  
36 efforts and represent performance standards for considering the effectiveness of conservation  
37 actions for the species.

38 The acres of protection contained in the near-term Plan goals and the additional detail in the  
39 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
40 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
41 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
42 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
43 has been affected. However, because the modeled habitat impacted largely consists of small patches  
44 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse  
45 population-level effect on the species in the near-term time period.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
7 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
8 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
9 *Measures.*

#### 10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
12 nesting and migratory habitat for yellow-breasted chat. Alternative 1A as a whole would result in  
13 the permanent loss of and temporary effects on 811 acres of modeled habitat (6% of the modeled  
14 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
15 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
16 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses  
17 would be in fragmented riparian habitat throughout the study area.

18 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
19 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
20 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
21 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
22 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
23 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
24 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
25 the restored and protected riparian natural would be expected to provide suitable habitat  
26 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
27 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
28 natural erosion and deposition, which would provide conditions conducive to the establishment of  
29 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
30 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
31 population in the Plan Area, a cowbird control program would be implemented through *CM11*  
32 *Natural Communities Enhancement and Management.* Goals and objectives in the Plan for riparian  
33 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
34 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

35 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
36 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
37 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
38 chat.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
40 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
41 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
44 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would

1 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
2 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
3 *Measures*.

4 **NEPA Effects:** The loss of western yellow-breasted chat habitat and potential direct mortality of this  
5 special-status species would represent an adverse effect in the absence of other conservation  
6 actions. It would take 5 years to several decades for ecological succession to occur and for restored  
7 riparian habitat to functionally replace habitat that has been affected. However, because the nesting  
8 and migratory habitat that would be lost is small relative to the species' range throughout California  
9 and North America, and because the habitat that would be lost consists of small, fragmented riparian  
10 stands that do not provide high-value habitat for the species, BDCP actions would not be expected to  
11 have an adverse population-level effect on the species. With habitat protection and restoration  
12 associated with CM3, CM7, and CM11, guided by biological goals and objectives and by *AMM1*  
13 *Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*  
14 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*  
15 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable*  
16 *Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song*  
17 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in  
18 place throughout the construction period, the effects of habitat loss and potential mortality on  
19 yellow-breasted chat under Alternative 1A would not be adverse.

#### 20 **CEQA Conclusion:**

##### 21 **Near-Term Timeframe**

22 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
23 term BDCP conservation strategy has been evaluated to determine whether it would provide  
24 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
25 impact of construction would be less than significant under CEQA. The Plan would remove 515 acres  
26 of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would  
27 result from the construction of the water conveyance facilities (CM1, 47 acres of modeled nesting  
28 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
29 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
30 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would  
31 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value  
32 habitat for the species.

33 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
34 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
35 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
36 habitat. Using these ratios would indicate that 47 acres of valley/foothill riparian habitat should be  
37 restored/created and 47 acres should be protected to compensate for the CM1 losses of yellow-  
38 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
39 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
40 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
41 protection).

42 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
43 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
44 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as



1 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
2 yellow-breasted chat. The majority of the riparian restoration acres would occur in CZ 7 as part of a  
3 reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
4 community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*). Goals and  
5 objectives in the Plan for riparian restoration also include the restoration, maintenance and  
6 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among  
7 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and  
8 grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural habitat  
9 requirements, so only the early- to mid-successional portions of the restored and protected riparian  
10 natural would be expected to provide suitable habitat characteristics for the species. These natural  
11 community biological goals and objectives would inform the near-term protection and restoration  
12 efforts and represent performance standards for considering the effectiveness of conservation  
13 actions for the species.

14 The acres of protection contained in the near-term Plan goals and the additional detail in the  
15 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
16 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
17 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
18 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
19 has been affected. However, because the modeled habitat impacted largely consists of small patches  
20 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have a significant  
21 population-level impact on the species in the near-term time period.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
27 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
28 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
29 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
30 *Measures*.

### 31 **Late Long-Term Timeframe**

32 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
33 nesting and migratory habitat for yellow-breasted chat. Alternative 1A as a whole would result in  
34 the permanent loss of and temporary effects on 811 acres of modeled habitat (6% of the modeled  
35 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
36 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
37 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
38 would be in fragmented riparian habitat throughout the study area.

39 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
40 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
41 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
42 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
43 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
44 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted

1 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
2 the restored and protected riparian natural would be expected to provide suitable habitat  
3 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
4 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
5 natural erosion and deposition, which would provide conditions conducive to the establishment of  
6 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
7 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
8 population in the Plan Area, a cowbird control program would be implemented through *CM11*  
9 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian  
10 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
11 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
13 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
14 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
15 chat.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
21 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
22 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
23 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
24 *Measures*.

25 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
26 of new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
27 restoration activities, and implementation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow,*  
28 *Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat and direct  
29 mortality through implementation of Alternative 1A would not result in a substantial adverse effect  
30 through habitat modifications and would not substantially reduce the number or restrict the range  
31 of the species. Therefore, the loss of habitat and potential mortality under this alternative would  
32 have a less-than-significant impact on western yellow-breasted chat.

### 33 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing** 34 **the Water Conveyance Facilities**

35 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance  
36 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could  
37 temporarily reduce the extent of and functions supported by the affected habitat. Because of the  
38 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and  
39 because CM5 would restore and protect contiguous high-value riparian habitat in CZ 7, any such  
40 habitat fragmentation is expected to have no or minimal effect on the species.

41 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-  
42 breasted chat. The habitat functions for the species would be significantly improved through the  
43 implementation of CM5, which would restore and protect large contiguous patches of riparian  
44 habitat.

1 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on  
2 yellow-breasted chat. The habitat functions for the species would be significantly improved through  
3 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
4 habitat.

5 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission**  
6 **Facilities**

7 New transmission lines would increase the risk for bird-power line strikes, which could result in  
8 injury or mortality of yellow-breasted chat. Yellow-breasted chats are migratory and usually arrive  
9 at California breeding grounds in April from their wintering grounds in Mexico and Guatemala.  
10 Departure for wintering grounds occurs from August to September. These are periods of relative  
11 high visibility when the risk of powerline collisions would be low. The species' small, relatively  
12 maneuverable body; its foraging behavior; and its presence in the Plan Area during the summer  
13 contribute to a low risk of collision with the proposed transmission lines (BDCP Attachment 5J.C,  
14 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). New transmission lines  
15 would therefore not be expected to have an adverse effect on yellow-breasted chat.

16 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
17 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal  
18 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in  
19 the study area during the summer, when visibility is high.

20 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
21 significant impact on yellow-breasted chat because the risk of bird-strike is considered to be  
22 minimal based on the species' small, relatively maneuverable body, its foraging behavior, and its  
23 presence in the Plan Area during the summer during periods of high visibility.

24 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

25 Noise and visual disturbances associated with construction-related activities could result in  
26 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to  
27 proposed construction areas. Construction noise above background noise levels (greater than 50  
28 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
29 *Attachment 5J.D, Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
30 *Crane, Table 4*), although there are no available data to determine the extent to which these noise  
31 levels could affect yellow-breasted chat. Indirect effects associated with construction include noise,  
32 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
33 operations outside the project footprint but within 1,300 feet of the construction edge. If yellow-  
34 breasted chat were to nest in or adjacent to work areas, construction and subsequent maintenance-  
35 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and  
36 reduce the functions of suitable nesting habitat for these species. These potential effects would be  
37 minimized with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
38 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, which would ensure 250-foot no-disturbance  
39 buffers were established around active nests. The use of mechanical equipment during water  
40 conveyance facilities construction could cause the accidental release of petroleum or other  
41 contaminants that could affect yellow-breasted chat in the surrounding habitat. The inadvertent  
42 discharge of sediment or excessive dust adjacent to yellow-breasted chat habitat could also affect  
43 the species. AMM1–AMM7, including *AMM2 Construction BMPs and Monitoring*, in addition to

1 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*  
2 would minimize the likelihood of such spills from occurring and ensure that measures were in place  
3 to prevent runoff from the construction area and any adverse effects of dust on active nests. If  
4 present, yellow-breasted chat individuals could be temporarily affected by noise and visual  
5 disturbances adjacent to water conveyance construction sites, *AMM23 Suisun Song Sparrow, Yellow-*  
6 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would minimize this effect on the  
7 species.

8 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and  
9 sedimentation, and the potential impacts of operations and maintenance of the water conveyance  
10 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of  
11 *AMM1–AMM7 and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
12 *Yellow-Billed Cuckoo* into the BDCP.

13 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust  
14 and sedimentation, and the potential impacts of operations and maintenance of the water  
15 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the  
16 incorporation of *AMM1–AMM7 and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
17 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

#### 18 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of** 19 **Implementation of Conservation Components**

20 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
21 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and  
22 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or  
23 its habitat are expected because the chat breeding period is outside the period the weir would be  
24 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo  
25 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of  
26 these vegetation types.

27 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148  
28 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to  
29 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the  
30 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains  
31 is expected to restore a more natural flood regime in support of riparian vegetation types that  
32 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal  
33 inundation in existing riparian natural communities is likely to be beneficial because, historically,  
34 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
35 flooding promotes the germination and establishment of many native riparian plants.

36 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain  
37 restoration would be expected to create more natural flood regimes that would support riparian  
38 habitat, which would not result in an adverse effect on yellow breasted chat.

39 **CEQA Conclusion:** By creating more natural flood regimes that would support riparian habitat,  
40 increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain restoration  
41 would have a beneficial impact on yellow breasted chat.

1 **Cooper's Hawk and Osprey**

2 This section describes the effects of Alternative 1A, including water conveyance facilities  
3 construction and implementation of other conservation components, on Cooper's hawk and osprey.  
4 Although osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will  
5 nest in more developed landscapes, modeled nesting habitat for these species is restricted to  
6 valley/foothill riparian forest.

7 Construction and restoration associated with Alternative 1A conservation measures would result in  
8 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in  
9 Table 12-1A-43. The majority of the losses would take place over an extended period of time as tidal  
10 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be  
11 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats  
12 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat  
13 function would be minimized by specific requirements of *AMM18 Swainson's Hawk and White-Tailed*  
14 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of  
15 Alternative 1A would include the following conservation actions over the term of the BDCP which  
16 would also benefit Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
17 *Objectives*).

- 18 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
19 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
20 associated with CM7)
- 21 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
22 10 (Objective VFRNC1.2, associated with CM3).
- 23 ● Plant and maintain native trees along roadsides and field borders within protected cultivated  
24 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 25 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
26 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
27 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
28 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).

29 As explained below, with the acres of restoration or protection included in the Plan, in addition to  
30 management activities to enhance natural communities for species and the implementation of  
31 *AMM1-AMM7*, *AMM18 Swainson's Hawk and White-tailed Kite*, and Mitigation Measure BIO-75,  
32 impacts on Cooper's hawk and osprey would not be adverse for NEPA purposes and would be less  
33 than significant for CEQA purposes.

1 **Table 12-1A-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with**  
2 **Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	29	29	20	20	NA	NA
<b>Total Impacts CM1</b>		<b>29</b>	<b>29</b>	<b>20</b>	<b>20</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	312	507	88	121	48-82	230
<b>Total Impacts CM2-CM18</b>		<b>312</b>	<b>507</b>	<b>88</b>	<b>121</b>	<b>48-82</b>	<b>230</b>
<b>TOTAL IMPACTS</b>		<b>341</b>	<b>536</b>	<b>108</b>	<b>141</b>	<b>48-82</b>	<b>230</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**  
5 **Osprey**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 677 acres of modeled nesting habitat (536 acres of permanent loss, 141 acres of temporary  
8 loss) habitat for Cooper’s hawk and osprey (Table 12-1A-43). Conservation measures that would  
9 result in these losses are Water Facilities and Operation (CM1) (which would involve construction of  
10 conveyance facilities and transmission lines and establishment and use of borrow and spoil areas),  
11 Yolo Bypass Fisheries Enhancement (CM2), Tidal Natural Communities Restoration (CM4), and  
12 Seasonally Inundated Floodplain Restoration (CM5). Habitat enhancement and management  
13 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,  
14 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
15 long-term operation of the water conveyance facilities and other BDCP physical facilities could affect  
16 Cooper’s hawk and osprey modeled habitat. Each of these individual activities is described below. A  
17 summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
18 individual conservation measure discussions.

- 19 • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 1A water  
20 conveyance facilities would result in the combined permanent and temporary loss of up to 49  
21 acres of modeled Cooper’s hawk and osprey habitat (Table 12-1A-43). Of the 49 acres of  
22 modeled habitat that would be removed for the construction of the conveyance facilities, 29  
23 acres would be a permanent loss and 20 acres would be a temporary loss of habitat. This loss  
24 would have the potential to displace individuals, if present, and remove the functions and value  
25 of potentially suitable habitat. Activities that would impact modeled habitat consist of tunnel,

1 forebay, and intake construction, temporary access roads, and construction of transmission  
2 lines. Impacts resulting from CM1 would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and  
3 CZ 8. There are no occurrences of Cooper's hawk or osprey that overlap with the construction  
4 footprint for CM1. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
5 *Avoid Disturbance of Nesting Birds*, would require pre-construction surveys and the  
6 establishment of no-disturbance buffers and would be available to address potential effects on  
7 cooper's hawk and osprey if either species were to nest in or adjacent to the construction  
8 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1A  
9 construction locations. Impacts from CM1 would occur within the first 10 years of Alternative  
10 1A implementation.

- 11 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
12 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's  
13 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the  
14 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in  
15 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
16 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
17 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
18 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. The loss is  
19 expected to occur during the first 10 years of Alternative 1A implementation.
- 20 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently  
21 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not  
22 be actively removed but tree mortality would be expected over time as areas became tidally  
23 inundated.
- 24 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
25 seasonally inundated floodplain and riparian restoration actions would remove approximately  
26 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of  
27 temporary loss). These losses would be expected after the first 10 years of Alternative 1A  
28 implementation along the San Joaquin River and other major waterways in CZ 7. CM11 Natural  
29 Communities Enhancement and Management: Habitat management- and enhancement-related  
30 activities could disturb Cooper's hawk and osprey nests if they were present near work sites. A  
31 variety of habitat management actions included in CM11 Natural Communities Enhancement  
32 and Management that are designed to enhance wildlife values in BDCP-protected habitats may  
33 result in localized ground disturbances that could temporarily remove small amounts of  
34 Cooper's hawk and osprey habitat and reduce the functions of habitat until restoration is  
35 complete. Ground-disturbing activities, such as removal of nonnative vegetation and road and  
36 other infrastructure maintenance, are expected to have minor effects on available Cooper's  
37 hawk and osprey habitat and are expected to result in overall improvements to and  
38 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but  
39 are expected to be minimal and would be avoided and minimized by the AMMs listed below.

40 Permanent and temporary habitat losses from the above conservation measures would  
41 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
42 as riparian habitat within 1 year following completion of construction activities. Although the  
43 effects are considered temporary, the restored riparian habitat would require 1 to several  
44 decades to functionally replace habitat that has been affected and for trees to attain sufficient  
45 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk and*

1 *White-Tailed Kite* contains actions described below to reduce the effect of temporal loss of  
2 nesting habitat, including the transplanting of mature trees.

- 3 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
4 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
5 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.  
6 Maintenance activities would include vegetation management, levee and structure repair, and  
7 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
8 AMM1–AMM7 and conservation actions as described below.
- 9 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
10 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan  
11 Area, because they would be expected to avoid contact with construction and other equipment.  
12 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,  
13 including equipment operation, noise and visual disturbances could affect nests or lead to their  
14 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
15 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
16 be available to address these potential effects on Cooper's hawk and osprey.

17 The following paragraphs summarize the combined effects discussed above and describe other  
18 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
19 included.

#### 20 ***Near-Term Timeframe***

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
23 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
24 effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338  
25 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting habitat  
26 in the study area in the near-term. These effects would result from the construction of the water  
27 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*  
28 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
29 *Inundated Floodplain Restoration—400 acres of habitat*).

30 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
31 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.  
32 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49  
33 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and osprey  
34 habitat. In addition, The near-term effects of other conservation actions would remove 400 acres of  
35 modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of  
36 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

37 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
38 valley/foothill riparian natural community (Table 3-4 in Chapter 3). These conservation actions are  
39 associated with CM3, and CM7 and would occur in the same timeframe as the construction and early  
40 restoration losses. The majority of riparian protection and restoration acres would occur in CZ 7 as  
41 part of a reserve system with extensive wide bands or large patches of valley/foothill riparian  
42 natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*).  
43 Riparian restoration would expand the patches of existing riparian forest in order to support nesting  
44 habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk and osprey by



1 protecting small but essential habitats that occur within cultivated lands, such as tree rows along  
2 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective  
3 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by  
4 planting and maintaining native trees along roadsides and field borders within protected cultivated  
5 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

6 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
7 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
8 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
9 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
10 would require one to several decades to functionally replace habitat that has been affected and for  
11 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
12 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
13 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
14 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
15 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
16 habitat would further reduce this limited resource and could reduce or restrict the number of active  
17 nests within the study area until restored riparian habitat is sufficiently developed.

18 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
19 trees, including transplanting trees scheduled for removal. These would be supplemented with  
20 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
21 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
22 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
23 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
24 term period. A variety of native tree species would be planted to provide trees with differing growth  
25 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
26 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
27 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
28 trees that were incorporated into the riparian restoration would not be clustered in a single region  
29 of the study area, but would be distributed throughout the conserved lands.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
35 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
36 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
37 osprey are not species that are covered under the BDCP. For the BDCP to have a less than adverse  
38 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
39 ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
40 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
41 address this potential effect.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
3 and osprey. Alternative 1A as a whole would result in the permanent loss of and temporary effects  
4 on 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
6 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
7 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
8 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and  
9 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
10 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
11 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
12 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
13 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within  
14 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
15 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
16 potential nest trees would be increased by planting and maintaining native trees along roadsides  
17 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
18 SWHA2.1).

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
26 osprey are not species that are covered under the BDCP. For the BDCP to avoid an adverse effect on  
27 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
28 active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
29 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this potential  
30 effect.

31 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential for direct mortality of  
32 these special-status species under Alternative 1A would represent an adverse effect in the absence  
33 of other conservation actions. However, with habitat protection and restoration associated with  
34 CM3, CM5, CM7, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*  
35 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
36 the effects of habitat loss on Cooper's hawk and osprey under Alternative 1A would not be adverse.  
37 Cooper's hawk and osprey are not covered species under the BDCP and, in order for the BDCP not to  
38 have an adverse effect on individuals, preconstruction surveys for noncovered avian species would  
39 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be  
40 available to address this effect.

41 **CEQA Conclusion:**

42 **Near-Term Timeframe**

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
2 effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338  
3 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting habitat  
4 in the study area in the near-term. These effects would result from the construction of the water  
5 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (CM2 *Yolo*  
6 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
7 *Inundated Floodplain Restoration*—400 acres of habitat).

8 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
9 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.  
10 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49  
11 acres should be protected to mitigate the CM1 losses of modeled Cooper's hawk and osprey habitat.  
12 In addition, The near-term effects of other conservation actions would remove 400 acres of modeled  
13 breeding habitat, and therefore require 400 acres of restoration and 400 acres of protection of  
14 modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios. The BDCP has  
15 committed to near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill  
16 riparian natural community (Table 3-4 in Chapter 3). These conservation actions are associated  
17 with CM3, and CM7 and would occur in the same timeframe as the construction and early  
18 restoration losses. The majority of riparian protection and restoration acres would occur in CZ 7 as  
19 part of a reserve system with extensive wide bands or large patches of valley/foothill riparian  
20 natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*).  
21 Riparian restoration would expand the patches of existing riparian forest in order to support nesting  
22 habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk and osprey by  
23 protecting small but essential habitats that occur within cultivated lands, such as tree rows along  
24 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective  
25 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by  
26 planting and maintaining native trees along roadsides and field borders within protected cultivated  
27 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

28 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
29 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
30 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
31 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
32 would require one to several decades to functionally replace habitat that has been affected and for  
33 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
34 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
35 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
36 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
37 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
38 habitat would further reduce this limited resource and could reduce or restrict the number of active  
39 nests within the study area until restored riparian habitat is sufficiently developed.

40 *AMM18 Swainson's hawk and White-Tailed kite* would implement a program to plant large mature  
41 trees, including transplanting trees scheduled for removal. These would be supplemented with  
42 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
43 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
44 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
45 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
46 term period. A variety of native tree species would be planted to provide trees with differing growth

1 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
2 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
3 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
4 trees that were incorporated into the riparian restoration would not be clustered in a single region  
5 of the study area, but would be distributed throughout the conserved lands.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
10 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
11 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
12 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
13 osprey are not species that are covered under the BDCP. For the BDCP to avoid a significant impact  
14 on individuals, preconstruction surveys for noncovered avian species would be required to ensure  
15 that active nests are detected and avoided. Mitigation Measure BIO-75 would reduce the potential  
16 impact on nesting Cooper's hawk and osprey to a less-than-significant level.

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

18 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
19 and osprey. Alternative 1A as a whole would result in the permanent loss of and temporary effects  
20 on 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
22 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
23 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
24 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
25 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
26 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
27 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
28 expand the patches of existing riparian forest in order to support nesting habitat for riparian  
29 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but  
30 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,  
31 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the  
32 distribution and abundance of potential nest trees would be increased by planting and maintaining  
33 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree  
34 per 10 acres (Objective SWHA2.1).

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
39 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
40 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
41 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
42 osprey are not species that are covered under the BDCP. For the BDCP to have a less-than-significant  
43 impact on individuals, preconstruction surveys for noncovered avian species would be required to  
44 ensure that active nests are detected and avoided. Implementation of Mitigation Measure BIO-75,

1 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce  
2 this impact to a less-than-significant level.

3 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
4 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
5 restoring riparian habitats lost to construction and restoration activities, and implementation of  
6 AMM1-AMM7, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75, the  
7 loss of habitat and direct mortality through implementation of Alternative 1A would not result in a  
8 substantial adverse effect through habitat modifications and would not substantially reduce the  
9 number or restrict the range of either species. Therefore, the loss of habitat and potential mortality  
10 under this alternative would have a less-than-significant impact on Cooper's hawk and osprey.

11 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
12 **Disturbance of Nesting Birds**

13 See Mitigation Measure BIO-75 under Impact BIO-75.

14 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**  
15 **Transmission Facilities**

16 New transmission lines would increase the risk for bird-power line strikes, which could result in  
17 injury or mortality of Cooper's hawk and osprey. The existing network of transmission lines in the  
18 Plan Area currently poses the same small risk for Cooper's hawk and osprey, and any incremental  
19 risk associated with the new power line corridors would also be expected to be low. *AMM20 Greater*  
20 *Sandhill Crane*, which would install flight-diverters on new and selected existing transmission lines  
21 would further reduce any potential effects.

22 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
23 could result in injury or mortality of Cooper's hawk and osprey. With the implementation of *AMM20*  
24 *Greater Sandhill Crane*, which would install flight-diverters on new and selected existing  
25 transmission lines, there would not be an adverse effect on Cooper's hawk and osprey.

26 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
27 could result in injury or mortality of Cooper's hawk and osprey. *AMM20 Greater Sandhill Crane*,  
28 which would install flight-diverters on new and selected existing transmission lines, would  
29 minimize this risk would reduce the impact of new transmission lines on Cooper's hawk and osprey  
30 to a less-than-significant level.

31 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

32 **Indirect construction- and operation-related effects:** Construction noise above background noise  
33 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
34 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
35 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
36 the extent to which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or  
37 osprey were to nest in or adjacent to work areas, construction and subsequent maintenance-related  
38 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce  
39 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*  
40 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the  
41 potential for adverse effects of construction-related activities on survival and productivity of nesting

1 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities  
2 construction could cause the accidental release of petroleum or other contaminants that could affect  
3 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or  
4 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.  
5 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would  
6 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from  
7 the construction area and negative effects of dust on active nests.

8 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
9 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under  
10 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
11 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
12 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
13 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
14 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

15 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
16 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
17 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
18 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
19 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
20 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
21 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
22 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via  
23 uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

24 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
25 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
26 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
27 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
28 adaptive management as described in CM12 would be available to address the uncertainty of  
29 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

30 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
31 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,  
32 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
33 could result in ongoing but periodic postconstruction disturbances that could affect Cooper's hawk  
34 and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
35 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address potential  
36 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
37 communities restoration or floodplain restoration could result in increased exposure of Cooper's  
38 hawk or osprey to methylmercury, through the ingestion of fish or small mammals in tidally  
39 restored areas. However, it is currently unknown what concentrations of methylmercury are  
40 harmful to these species and the potential for increased exposure varies substantially within the  
41 study area. Site-specific restoration plans that address the creation and mobilization of mercury, as  
42 well as monitoring and adaptive management as described in CM12 would better inform potential  
43 impacts and address the uncertainty of methylmercury levels in restored tidal marsh in the study  
44 area on cooper's hawk and osprey. The site-specific planning phase of marsh restoration would be

1 the appropriate place to assess the potential for risk of methylmercury exposure for Cooper's hawk  
2 and osprey, once site specific sampling and other information could be developed.

3 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
4 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.  
5 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
6 facilities, could result in ongoing but periodic postconstruction disturbances that could affect  
7 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,  
8 increased dust and sedimentation, and operations and maintenance of the water conveyance  
9 facilities under Alternative 1A would have a less-than-significant impact on Cooper's hawk and  
10 osprey with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
11 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1-AMM7. The implementation of tidal  
12 natural communities restoration or floodplain restoration could result in increased exposure of  
13 Cooper's hawk or osprey to methylmercury through the ingestion of fish or small mammals in  
14 restored tidal areas. However, it is currently unknown what concentrations of methylmercury are  
15 harmful to these species. Site-specific restoration plans that address the creation and mobilization of  
16 mercury, as well as monitoring and adaptive management as described in CM12, would address the  
17 uncertainty of methylmercury levels in restored tidal marsh in the study area and better inform  
18 potential impacts on Cooper's hawk and osprey.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
20 **Disturbance of Nesting Birds**

21 See Mitigation Measure BIO-75 under Impact BIO-75.

22 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**  
23 **as a Result of Implementation of Conservation Components**

24 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
25 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey  
26 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on  
27 breeding habitat because trees in which nest sites are situated already withstand floods, the  
28 increase in inundation frequency and duration is expected to remain within the range of tolerance of  
29 riparian trees, and nest sites are located above floodwaters.

30 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
31 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of  
32 seasonal inundation in existing riparian natural communities is likely to be beneficial for these  
33 species, because, historically, flooding was the main natural disturbance regulating ecological  
34 processes in riparian areas, and flooding promotes the germination and establishment of many  
35 native riparian plants.

36 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
37 sites because trees in which nest sites are situated already withstand floods, the increase in  
38 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
39 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic  
40 inundation resulting from CM2 and CM5 would not have an adverse effect on Cooper's hawk and  
41 osprey.

1 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
2 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
3 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
4 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic  
5 inundation resulting from CM2 and CM5 would have a less-than-significant impact on Cooper's  
6 hawk and osprey.

## 7 **Golden Eagle and Ferruginous Hawk**

8 This section describes the effects of Alternative 1A, including water conveyance facilities  
9 construction and implementation of other conservation components, on golden eagle and  
10 ferruginous hawk. Modeled foraging habitat for these species consists of grassland, alkali seasonal  
11 wetland, vernal pool complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study  
12 area.

13 Construction and restoration associated with Alternative 1A conservation measures would result in  
14 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging  
15 habitat as indicated in Table 12-1A-44. Full implementation of Alternative 1A would include the  
16 following conservation actions over the term of the BDCP that would also benefit golden eagles or  
17 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 18 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
19 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
20 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 21 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 22 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
23 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 24 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
25 VPNC2.5, and GNC2.4, associated with CM11).
- 26 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
27 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 28 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
29 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
30 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

31 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
32 management activities to enhance natural communities for species and implementation of AMM1-  
33 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and  
34 would be less than significant for CEQA purposes.



1 **Table 12-1A-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**  
2 **Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	1,660	1,660	673	673	NA	NA
<b>Total Impacts CM1</b>		<b>1,660</b>	<b>1,660</b>	<b>673</b>	<b>673</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	5,450	26,198	376	893	1,158–3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158–3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>7,110</b>	<b>27,858</b>	<b>1,049</b>	<b>1,566</b>	<b>1,158–3,650</b>	<b>3,823</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**  
5 **Ferruginous Hawk**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 29,424 acres of modeled foraging habitat for golden eagle and ferruginous hawk (27,858  
8 acres of permanent loss and 1,566 acres of temporary loss, Table 12-1A-44). Conservation measures  
9 that would result in these losses are conveyance facilities and transmission line construction, and  
10 establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2),  
11 tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland  
12 restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10),  
13 and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres)  
14 would result from CM4. Habitat enhancement and management activities (CM11), which include  
15 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,  
16 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities  
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
18 facilities could degrade or eliminate golden eagle foraging habitat. Each of these individual activities  
19 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
20 conclusion follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
22 result in the combined permanent and temporary loss of up to 2,333 acres of modeled golden  
23 eagle and ferruginous hawk foraging habitat (1,660 acres of permanent loss, 673 acres of  
24 temporary loss) from CZs 3-6 and CZ 8. The majority of habitat that would be removed would be  
25 in CZ 8, from the construction of the new forebay (685 acres) and the four proposed Reusable  
26 Tunnel Material storage areas in the central Delta (on Victoria Island, Bacon Island, Tyler Island,

1 and Andrus Island) that are each approximately 288-572 acres. The potential borrow spoil site  
2 southwest of the proposed forebay would also temporarily remove golden eagle and ferruginous  
3 hawk foraging habitat. The CM1 construction footprint does not overlap with any occurrences of  
4 golden eagle or ferruginous hawk. However, some of the grassland habitat lost in CZ 8 is  
5 composed of larger stands of ruderal and herbaceous vegetation and California annual  
6 grassland, which provides high-value foraging habitat for these species. Refer to the Terrestrial  
7 Biology Map Book for a detailed view of Alternative 1A construction locations. Impacts from  
8 CM1 would occur within the first 10 years of Alternative 1A implementation.

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
10 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
11 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of  
12 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
13 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
14 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
15 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
16 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
17 years of Alternative 1A implementation.
- 18 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
19 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and  
20 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs  
21 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on  
22 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
23 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact  
24 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in  
25 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex  
26 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of  
27 Suisun Marsh.
- 28 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
29 seasonally inundated floodplain would permanently and temporarily remove approximately  
30 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,  
31 517 temporary). These losses would be expected after the first 10 years of Alternative 1A  
32 implementation along the San Joaquin River and other major waterways in CZ 7.
- 33 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
34 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
35 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
36 would be restored after the construction periods. Grassland restoration would be implemented  
37 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk  
38 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 39 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
40 removal of 705 acres of golden eagle and ferruginous hawk foraging habitat.
- 41 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
42 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
43 habitats could result in localized ground disturbances that could temporarily remove small  
44 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,  
45 such as removal of nonnative vegetation and road and other infrastructure maintenance

1 activities, would be expected to have minor adverse effects on available habitat for these  
2 species. CM11 would also include the construction of recreational-related facilities including  
3 trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*  
4 *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,  
5 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.  
6 However, approximately 50 acres of grassland habitat would be lost from the construction of  
7 trails and facilities.

- 8 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
9 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and  
10 longfin smelt conservation hatchery in CZ 1.
- 11 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.  
14 Maintenance activities would include vegetation management, levee and structure repair, and  
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
16 AMM1–AMM7 and conservation actions as described below.
- 17 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
18 golden eagle and ferruginous hawk because foraging individuals would be expected to  
19 temporarily avoid the increased noise and activity associated with construction areas.

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

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

24 Because the water conveyance facility construction is being evaluated at the project level, the near-  
25 term BDCP conservation strategy has been evaluated to determine whether it would provide  
26 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
27 such conveyance facility construction would not be adverse under NEPA. The Plan would remove  
28 8,167 acres (7,110 permanent, 1,049 temporary) of modeled golden eagle and ferruginous hawk  
29 foraging habitat in the study area in the near-term. These effects would result from the construction  
30 of the water conveyance facilities (CM1, 2,333 acres), and implementing other conservation  
31 measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7*  
32 *Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal*  
33 *Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and*  
34 *Management* and *CM18 Conservation Hatcheries*—5,826 acres).

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
36 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be  
37 protected to compensate for the CM1 losses of 2,333 acres of golden eagle and ferruginous hawk  
38 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
39 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
40 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

41 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
42 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
43 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
2 in the same timeframe as the construction and early restoration losses thereby avoiding adverse  
3 effects of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland  
4 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11. (Objectives GNC1.1 and  
5 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali  
6 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
7 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
8 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels  
9 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect  
10 and mammal prey populations would be increased on protected lands, enhancing the foraging value  
11 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability  
12 would be increased on protected natural communities by encouraging ground squirrel occupancy  
13 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
14 squirrel control programs (i.e., poisoning).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
16 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk  
17 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time  
18 period would be in alfalfa and pasture crop types (very high- and high-value crop types for  
19 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.  
20 This biological objective provides an estimate for the high proportion of cultivated lands protected  
21 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

22 The acres of restoration and protection contained in the near-term Plan goals and the additional  
23 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
24 level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate the near-term effects  
25 of the other conservation measures with the consideration that some portion of the 15,400 acres of  
26 cultivated lands protected in the near-term timeframe would be managed in suitable crop types to  
27 compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-113, *Compensate for the*  
28 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, would be available to  
29 address the effect of habitat loss in the near-term.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
35 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
36 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 37 ***Late Long-Term Timeframe***

38 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled  
39 foraging habitat for golden eagle and ferruginous hawk. Alternative 1A as a whole would result in  
40 the permanent loss of and temporary effects on 29,424 acres of modeled foraging habitat during the  
41 term of the Plan (11% of the modeled habitat in the study area). The locations of these losses are  
42 described above in the analyses of individual conservation measures.

43 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
44 *Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali*

1 *Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland  
2 natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal  
3 wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native  
4 wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration and  
5 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
6 protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland  
7 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
8 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand  
9 foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current levels of  
10 habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and  
11 small mammal prey populations would be increased on protected lands, enhancing the foraging  
12 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow  
13 availability would be increased on protected natural communities by encouraging ground squirrel  
14 occupancy and expansion through the creation of berms, mounds, edges, and through the  
15 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide  
16 habitat for covered and other native wildlife species would provide approximately 15,400 acres of  
17 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275  
18 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-  
19 value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and  
20 ferruginous hawk.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
26 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
27 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

28 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential for mortality of  
29 this special-status species under Alternative 1A would represent an adverse effect in the absence of  
30 other conservation actions. With habitat protection and restoration associated with CM3, CM8, CM9,  
31 and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place  
32 throughout the construction period, and with implementation of Mitigation Measure BIO-113,  
33 *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the  
34 effects of habitat loss and potential direct mortality on golden eagle and ferruginous hawk under  
35 Alternative 1A would not be adverse.

### 36 **CEQA Conclusion:**

#### 37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
41 effects of construction would be less than significant under CEQA. The Plan would remove 8,167  
42 acres (7,110 permanent, 1,049 temporary) of modeled golden eagle and ferruginous hawk foraging  
43 habitat in the study area in the near-term. These effects would result from the construction of the  
44 water conveyance facilities (CM1, 2,333 acres), and implementing other conservation measures

1 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian  
2 Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and  
3 Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and  
4 Management and CM18 Conservation Hatcheries—5,826 acres).

5 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
6 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be  
7 protected to compensate for the CM1 losses of 2,333 acres of golden eagle and ferruginous hawk  
8 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
9 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
10 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

11 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
12 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
13 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
14 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
15 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
16 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland  
17 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and  
18 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali  
19 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
20 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
21 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels  
22 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect  
23 and mammal prey populations would be increased on protected lands, enhancing the foraging value  
24 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability  
25 would be increased on protected natural communities by encouraging ground squirrel occupancy  
26 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
27 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and  
28 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat  
29 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands  
30 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-  
31 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden  
32 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of  
33 cultivated lands protected in the near-term time period which would be suitable for golden eagle  
34 and ferruginous hawk.

35 These Plan objectives represent performance standards for considering the effectiveness of  
36 conservation actions. The acres of restoration and protection contained in the near-term Plan goals  
37 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
38 applied to the project-level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate  
39 the near-term effects of the other conservation measures with the consideration that some portion  
40 of the 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in  
41 suitable crop types to compensate for the loss of habitat at a ratio of 2:1. The implementation of  
42 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*  
43 *Hawk Foraging Habitat*, would reduce the effect of habitat loss in the near-term to less than  
44 significant.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

### 8 **Late Long-Term Timeframe**

9 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled  
10 foraging habitat for golden eagle and ferruginous hawk. Alternative 1A as a whole would result in  
11 the permanent loss of and temporary effects on 29,424 acres of modeled foraging habitat during the  
12 term of the Plan (11% of the modeled habitat in the study area). The locations of these losses are  
13 described above in the analyses of individual conservation measures.

14 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
15 *Restoration, CM8 Grassland Natural Communities Restoration, and CM9 Vernal Pool and Alkali*  
16 *Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland  
17 natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal  
18 wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native  
19 wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1,  
20 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, CZ 8, and CZ 11  
21 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1  
22 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and  
23 vernal pool natural communities which would expand foraging habitat for golden eagle and  
24 ferruginous hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
25 *Natural Communities Enhancement and Management*, insect and small mammal prey populations  
26 would be increased on protected lands, enhancing the foraging value of these natural communities  
27 (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected  
28 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
29 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
30 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would  
31 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk  
32 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
33 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk  
34 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
36 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
37 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
38 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
39 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
40 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
41 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

42 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
43 of new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
44 restoration activities, and with the implementation of AMM1-AMM7, and Mitigation Measure BIO-

1 113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the  
2 loss of habitat or direct mortality through implementation of Alternative 1A would not result in a  
3 substantial adverse effect through habitat modifications and would not substantially reduce the  
4 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
5 under this alternative would have a less-than-significant impact on golden eagle and ferruginous  
6 hawk.

7 **Mitigation Measure BIO-113: Compensate for the Near-term Loss of Golden Eagle and**  
8 **Ferruginous Hawk Foraging Habitat**

9 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
10 crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the  
11 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
12 2:1. Additional grassland protection, enhancement, and management may be substituted for the  
13 protection of high-value cultivated lands.

14 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical**  
15 **Transmission Facilities**

16 New transmission lines would increase the risk that golden eagles and ferruginous hawks could be  
17 subject to power line strikes, which could result in injury or mortality of these species. Golden eagle  
18 and ferruginous hawk would be at low risk of bird strike mortality based on factors assessed in the  
19 bird strike vulnerability analysis (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird*  
20 *Collisions at Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new  
21 transmission lines and the flight behavior of species. The existing network of transmission lines in  
22 the Plan Area currently poses the same small risk for golden eagle and ferruginous hawk, and any  
23 incremental risk associated with the new power line corridors would also be expected to be low.  
24 *AMM20 Greater Sandhill Crane*, would further reduce any potential effects.

25 **NEPA Effects:** New transmission lines would minimally increase the risk for golden eagle and  
26 ferruginous hawk power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
27 potential effect of the construction of new transmission lines on golden eagle and ferruginous hawk  
28 would not be adverse.

29 **CEQA Conclusion:** New transmission lines would minimally increase the risk for golden eagle and  
30 ferruginous hawk power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
31 impact of the construction of new transmission lines on golden eagle and ferruginous hawk to a less-  
32 than-significant level.

33 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**  
34 **Hawk**

35 **Indirect construction-and operation-related effects:** Construction- and subsequent  
36 maintenance-related noise and visual disturbances could disrupt foraging, and reduce the functions  
37 of suitable foraging habitat for golden eagle and ferruginous hawk. Construction noise above  
38 background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of  
39 construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
40 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to  
41 determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.  
42 Indirect effects associated with construction include noise, dust, and visual disturbance caused by



1 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical  
2 equipment during water conveyance facilities construction could cause the accidental release of  
3 petroleum or other contaminants that could affect these species or their prey in the surrounding  
4 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
5 would minimize the likelihood of such spills. The inadvertent discharge of sediment or excessive  
6 dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a negative  
7 effect on the species. However, AMM1–AMM7 would also ensure that measures would be in place to  
8 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to  
9 work areas.

10 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 1A  
11 implementation could have adverse effects on these species through the modification of habitat.  
12 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1A  
13 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

14 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative  
15 1A implementation could have a significant impact on the species from modification of habitat. With  
16 the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1A  
17 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

#### 18 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk** 19 **Habitat as a Result of Implementation of Conservation Components**

20 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
21 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
22 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-1A-44).

23 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
24 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled  
25 habitat (Table 12-1A-44).

26 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and  
27 increased frequency and duration of inundation of grassland habitats may affect prey populations  
28 that have insufficient time to recover following inundation events. However, periodically inundated  
29 habitat would not be expected to have an adverse effect on local or migratory golden eagles or the  
30 wintering ferruginous hawk populations in the study area.

31 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on  
32 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In  
33 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of  
34 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on  
35 the wintering golden eagle or ferruginous hawk populations in the study area.

36 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation  
37 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging  
38 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823  
39 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-  
40 significant impact on the golden eagle and ferruginous hawk populations in the study area.

1 **Cormorants, Herons and Egrets**

2 This section describes the effects of Alternative 1A, including water conveyance facilities  
3 construction and implementation of other conservation components, on double-crested cormorant,  
4 great blue heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding  
5 habitat for these species consists of valley/foothill riparian forest.

6 Construction and restoration associated with Alternative 1A conservation measures would result in  
7 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated  
8 in Table 12-1A-45. The majority of the losses would take place over an extended period of time as  
9 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would  
10 be initiated in the same timeframe as the losses, it could take one or more decades for restored  
11 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of  
12 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk and*  
13 *White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
14 implementation of Alternative 1A would include the following conservation actions over the term of  
15 the BDCP which would also benefit cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3,  
16 *Biological Goals and Objectives*).

- 17 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
18 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
19 associated with CM7).
- 20 • Protect at least 750 acres of existing valley/foothill riparian natural community in C Z7 by year  
21 10 (Objective VFRNC1.2, associated with CM3).
- 22 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
23 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
24 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
25 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

26 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
27 management activities to enhance natural communities for species, *AMM1-AMM7, AMM18*  
28 *Swainson's Hawk and White-Tailed Kite*, Mitigation Measure BIO-75, and Mitigation Measure BIO-  
29 117, impacts on cormorants, herons, and egrets would not be adverse for NEPA purposes and would  
30 be less than significant for CEQA purposes.

1 **Table 12-1A-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**  
2 **Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting (Rookeries)	58	58	28	28	NA	NA
<b>Total Impacts CM1</b>		<b>58</b>	<b>58</b>	<b>28</b>	<b>28</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting (Rookeries)	387	684	88	123	51-92	266
<b>Total Impacts CM2-CM18</b>		<b>387</b>	<b>684</b>	<b>88</b>	<b>123</b>	<b>51-92</b>	<b>266</b>
<b>TOTAL IMPACTS</b>		<b>445</b>	<b>742</b>	<b>116</b>	<b>151</b>	<b>51-92</b>	<b>266</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**  
5 **Cormorants, Herons and Egrets**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 893 acres of modeled nesting habitat (742 acres of permanent loss and 151 acres of  
8 temporary loss) for double-crested cormorant, great blue heron, great egret, snowy egret, and black-  
9 crowned night heron (Table 12-1A-45). Conservation measures that would result in these losses are  
10 conveyance facilities and transmission line construction, and establishment and use of borrow and  
11 spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2), tidal natural  
12 communities restoration (CM4), and seasonally inundated floodplain restoration (CM5). Habitat  
13 enhancement and management activities (CM11) which include ground disturbance or removal of  
14 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
15 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
16 facilities could degrade or eliminate cormorant, heron, and egret modeled habitat. Each of these  
17 individual activities is described below. A summary statement of the combined impacts, NEPA  
18 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 19 • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 1A water  
20 conveyance facilities would result in the combined permanent and temporary loss of up to 86  
21 acres of modeled nesting habitat for cormorants, herons, and egrets (Table 12-1A-45). Of the 86  
22 acres of modeled habitat that would be removed for the construction of the conveyance  
23 facilities, 58 acres would be a permanent loss and 28 acres would be a temporary loss of habitat.  
24 This loss would have the potential to displace individuals, if present, and remove the functions

1 and value of potentially suitable habitat. Activities that would impact modeled nesting habitat  
2 consist of tunnel, forebay, and intake construction, temporary access roads, and construction of  
3 transmission lines. Most of the permanent loss would occur where Intakes 1–5 impact the  
4 Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very  
5 small patches, some dominated by valley oak and others by nonnative trees. Temporary losses  
6 would occur where pipelines cross Snodgrass Slough and other small waterways east of the  
7 Sacramento River, and where temporary work areas surround intake sites. The riparian habitat  
8 in these areas is also composed of very small patches or stringers bordering waterways, which  
9 are composed of valley oak and scrub vegetation. Impacts from CM1 would occur in the central  
10 delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. Impacts from CM1 would occur within the first 10 years  
11 of Alternative 1A implementation.

12 The primary impact of concern regarding double-crested cormorant, great blue heron, great  
13 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and  
14 other large trees associated with known nest sites. There is one great blue heron rookery that is  
15 currently intersected by the proposed permanent powerline associated with CM1, east of Little  
16 Mandeville Island. Because the species is highly traditional in their use of rookeries, the  
17 establishment of new nest sites is unpredictable. Therefore to avoid adverse effects on great  
18 blue herons (and cormorants, herons, and egrets, should future surveys detect additional  
19 rookeries), existing rookeries must be avoided. The transmission line alignment has not been  
20 finalized for Alternative 1A, and therefore, avoidance would be feasible. Mitigation Measure BIO-  
21 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and  
22 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries* would be available to address this  
23 potential effect on cormorants, herons, and egrets. Refer to the Terrestrial Biology Map Book for  
24 a detailed view of Alternative 1A construction locations.

- 25 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
26 would result in the combined permanent and temporary loss of up to 177 acres of nesting  
27 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.  
28 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to  
29 improve passage of fish through the bypasses. Most of the riparian losses would occur at the  
30 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to  
31 improve water movement in the Toe Drain and in the Sacramento Weir would also remove  
32 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 1A  
33 implementation.
- 34 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
35 inundation would permanently remove an estimated 552 acres of nesting habitat for  
36 cormorants, herons and egrets. Trees would not be actively removed but tree mortality would  
37 be expected over time as areas became tidally inundated. Depending on the extent and value of  
38 remaining habitat, this could reduce use of these habitats by these species. There is one CNDDB  
39 occurrence of a great blue heron rookery that overlaps with the hypothetical restoration  
40 footprint for tidal restoration. The occurrence is on Decker Island and tidal restoration could  
41 potentially impact the nest trees from inundation. This effect would need to be addressed within  
42 the project specific analysis for tidal restoration projects.
- 43 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
44 seasonally inundated floodplain would permanently remove approximately 43 acres and  
45 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting

1 habitat. These losses would be expected after the first 10 years of Alternative 1A  
2 implementation along the San Joaquin River and other major waterways in CZ 7.

- 3 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
4 enhancement-related activities could disturb cormorant, heron, and egret nests if they were  
5 present near work sites. A variety of habitat management actions included in CM11 that are  
6 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
7 disturbances that could temporarily remove small amounts of cormorant, heron, and egret  
8 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing  
9 activities, such as removal of nonnative vegetation and road and other infrastructure  
10 maintenance, are expected to have minor effects on available habitat for these species and are  
11 expected to result in overall improvements to and maintenance of habitat values over the term  
12 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be  
13 avoided and minimized by the AMMs listed below.
- 14 • Permanent and temporary habitat losses from the above conservation measures would  
15 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
16 as riparian habitat within 1 year following completion of construction activities. Although the  
17 effects are considered temporary, the restored riparian habitat would require years to several  
18 decades to functionally replace habitat that has been affected and for trees to attain sufficient  
19 size and structure for established rookeries. *AMM18 Swainson's Hawk and White-Tailed Kite*  
20 contains actions described below to reduce the effect of temporal loss of mature riparian  
21 habitat, including the transplanting of mature trees.
- 22 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
23 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
24 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.  
25 Maintenance activities would include vegetation management, levee and structure repair, and  
26 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
27 AMMs and conservation actions as described below.
- 28 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
29 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,  
30 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they  
31 would be expected to avoid contact with construction and other equipment. If birds were to nest  
32 in the construction area, construction-related activities, including equipment operation, noise  
33 and visual disturbances could affect nests or lead to their abandonment, potentially resulting in  
34 mortality of eggs and nestlings. Because cormorants, herons and egrets are highly traditional in  
35 their use of nest sites, all disturbance to nesting birds must be avoided or minimized. Mitigation  
36 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
37 *Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries* would be available to  
38 address these adverse effects on cormorants, herons, and egrets.

39 The following paragraphs summarize the combined effects discussed above and describe other  
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
41 included.

#### 42 ***Near-Term Timeframe***

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
2 effects of construction would not be adverse under NEPA. The Plan would remove 561 acres of  
3 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects  
4 would result from the construction of the water conveyance facilities (CM1, 86 acres of nesting  
5 habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
6 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration—*  
7 *475 acres of nesting habitat*).

8 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
9 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
10 breeding habitat. Using these ratios would indicate that 86 acres of breeding habitat should be  
11 restored/created and 86 acres should be protected to compensate for the CM1 losses of modeled  
12 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
13 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
14 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
15 same typical NEPA and CEQA ratios.

16 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
17 system with extensive wide bands or large patches of valley/foothill riparian natural community  
18 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
19 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
20 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
21 would also be maintained and protected such as isolated trees, tree rows along field borders or  
22 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

23 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
24 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
25 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
26 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
27 would require years to several decades to functionally replace habitat that has been affected and for  
28 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
29 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
30 herons and egrets in the near-term time period.

31 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
32 trees, including transplanting trees scheduled for removal. These would be supplemented with  
33 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
34 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
35 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
36 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
37 term period. A variety of native tree species would be planted to provide trees with differing growth  
38 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
39 restoration would not be clustered in a single region of the study area, but would be distributed  
40 throughout protected lands.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *Reusable Tunnel Material*, and *Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
4 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
5 species that are covered under the BDCP. For the BDCP to avoid adverse effects on individuals,  
6 existing nests and rookeries would have to be avoided. Mitigation Measure BIO-75, *Conduct*  
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
8 address effects on nesting cormorants, herons, and egrets.

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

10 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
11 habitat for cormorants, herons, and egrets. Alternative 1A as a whole would result in the permanent  
12 loss of and temporary effects on 893 acres of potential breeding habitat (5% of the potential  
13 breeding habitat in the study area).

14 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
15 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
16 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
17 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and  
18 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
19 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
20 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
21 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
22 also benefit cormorants, herons, and egrets by protecting small but essential habitats that occur  
23 within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
24 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
25 potential nest trees would be increased by planting and maintaining native trees along roadsides  
26 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
27 SWHA2.1).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
35 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
36 species that are covered under the BDCP. These species are highly traditional in their use of nest  
37 sites, and, in order for the BDCP to avoid a significant impact on individuals, preconstruction  
38 surveys would be required to ensure that nests are detected and any direct and indirect impacts on  
39 rookeries are avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
40 *Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*,  
41 would be available to address adverse effects on nesting cormorants, herons, and egrets.

42 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential for direct mortality of  
43 these special-status species under Alternative 1A would represent an adverse effect in the absence  
44 of other conservation actions. With habitat protection and restoration associated with CM3, CM5,

1 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and  
2 *AMM18 Swainson’s Hawk and White-Tailed Kite*, which would be in place throughout the  
3 construction period, the effects of habitat loss and potential mortality on cormorants, herons, and  
4 egrets under Alternative 1A would not be adverse. Double-crested cormorant, great blue heron,  
5 great egret, snowy egret, and black-crowned night heron are not species that are covered under the  
6 BDCP. Preconstruction surveys for noncovered species would be required for the BDCP to avoid an  
7 adverse effect on individuals. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
8 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on  
9 nesting cormorants, herons, and egrets.

10 **CEQA Conclusion:**

11 ***Near-Term Timeframe***

12 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
13 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
14 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
15 effects of construction would be less than significant under NEPA. The Plan would remove 561 acres  
16 of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These  
17 effects would result from the construction of the water conveyance facilities (CM1, 86 acres of  
18 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
19 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
20 *Restoration—475 acres of nesting habitat*).

21 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
22 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
23 breeding habitat. Using these ratios would indicate that 86 acres of breeding habitat should be  
24 restored/created and 86 acres should be protected to mitigate the CM1 losses of modeled  
25 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
26 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
27 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
28 same typical NEPA and CEQA ratios.

29 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
30 system with extensive wide bands or large patches of valley/foothill riparian natural community  
31 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
32 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
33 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
34 would also be maintained and protected such as isolated trees, tree rows along field borders or  
35 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

36 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
37 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
38 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
39 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
40 would require years to several decades to functionally replace habitat that has been affected and for  
41 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
42 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
43 herons and egrets in the near-term time period.



1 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
2 trees, including transplanting trees scheduled for removal. These would be supplemented with  
3 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
4 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
5 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
6 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
7 term period. A variety of native tree species would be planted to provide trees with differing growth  
8 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
9 restoration would not be clustered in a single region of the study area, but would be distributed  
10 throughout protected lands.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
12 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
13 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
16 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
17 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
18 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
19 species that are covered under the BDCP. For the BDCP to avoid a significant impact on individuals,  
20 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
21 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
22 *Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-significant  
23 level.

#### 24 ***Late Long-Term Timeframe***

25 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
26 habitat for cormorants, herons, and egrets. Alternative 1A as a whole would result in the permanent  
27 loss of and temporary effects on 871 acres of potential breeding habitat (5% of the potential  
28 breeding habitat in the study area).

29 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
30 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*  
31 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
32 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and  
33 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
34 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
35 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
36 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
37 also benefit cormorants, herons, and egrets by protecting small but essential habitats that occur  
38 within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
39 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
40 potential nest trees would be increased by planting and maintaining native trees along roadsides  
41 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
42 SWHA2.1).

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
4 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
5 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Double-crested*  
6 *cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not*  
7 *species that are covered under the BDCP. These species are highly traditional in their use of nest*  
8 *sites and, for the BDCP to avoid a significant impact on individuals, preconstruction surveys would*  
9 *be required to ensure that nests are detected and any direct and indirect impacts on rookeries are*  
10 *avoided. Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid*  
11 *Disturbance of Nesting Birds, and Mitigation Measure BIO-117, Avoid Impacts on Rookeries, would*  
12 *reduce this potential impact to a less-than-significant level.*

13 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
14 of new or enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost  
15 to construction and restoration activities, and considering implementation of AMM1–AMM7, *AMM18*  
16 *Swainson's Hawk and White-Tailed Kite*, Mitigation Measure BIO-75, and Mitigation Measure BIO-  
17 117, the loss of habitat or direct mortality through implementation of Alternative 1A would not  
18 result in a substantial adverse effect through habitat modifications and would not substantially  
19 reduce the number or restrict the range of cormorants, herons, and egrets. Therefore, the loss of  
20 habitat and potential mortality under this alternative would have a less-than-significant impact on  
21 cormorants, herons, and egrets.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

26 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);  
27 therefore, DWR will avoid all direct and indirect impacts on rookeries.

28 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**  
29 **Herons and Egrets**

30 New transmission lines would increase the risk for bird-power line strikes, which could result in  
31 injury or mortality of cormorants, herons and egrets. *AMM20 Greater Sandhill Crane* would minimize  
32 the risk for bird-power line strikes, for these species. This measure would ensure that conductor and  
33 ground lines are fitted with flight diverters in compliance with the best available practices, such as  
34 those specified in the USFWS Avian Protection Guidelines and would minimize the potential for an  
35 adverse effect.

36 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
37 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*,  
38 would reduce the potential for collisions on new and select existing powerlines in the study area.  
39 The construction of new transmission lines would not result in an adverse effect on cormorants,  
40 herons, and egrets.

1 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
2 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*,  
3 would reduce birdstrike on new transmission lines and select existing transmission lines with the  
4 installation of flight diverters. With these in place, new transmission lines would have a less-than-  
5 significant impact on cormorants, herons and egrets.

6 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

7 **Indirect construction- and operation-related effects:** Construction noise above background noise  
8 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
9 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
10 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
11 the extent to which these noise levels could affect cormorants, herons, or egrets. If cormorants,  
12 herons or egrets were to nest in or adjacent to work areas, construction and subsequent  
13 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
14 behaviors, and reduce the functions of suitable nesting habitat for these species. Mitigation Measure  
15 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
16 avoid the potential for adverse effects of construction-related activities on survival and productivity  
17 of nesting cormorants, herons, and egrets. The use of mechanical equipment during water  
18 conveyance facilities construction could cause the accidental release of petroleum or other  
19 contaminants that could affect cormorants, herons or egrets in the surrounding habitat. The  
20 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
21 adverse effect on these species. *AMM1–AMM7*, including *AMM2 Construction Best Management*  
22 *Practices and Monitoring*, would minimize the likelihood of such spills and ensure that measures are  
23 in place to prevent runoff from the construction area and negative effects of dust on active nests.

24 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
25 mercury in avian species, including cormorants, herons or egrets. Future operational impacts under  
26 *CM1* were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
27 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
28 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
29 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
30 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

31 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
32 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
33 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
34 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
35 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
36 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
37 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
38 natural community and floodplain restoration could indirectly effect on cormorants, herons or  
39 egrets, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

40 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
41 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
42 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
43 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
44 adaptive management as described in *CM12* would be available to address the uncertainty of

1 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or  
2 egrets.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
8 classes within a species. In addition, the effect of selenium on a species can be confounded by  
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
20 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
25 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.  
26 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
27 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
28 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
29 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
30 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
31 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
32 long-term increases in selenium concentrations in water in the Delta under any alternative.  
33 However, it is difficult to determine whether the effects of potential increases in selenium  
34 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
35 lead to adverse effects on cormorants, herons, and egrets.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a  
37 substantial effect on cormorants, herons, and egrets from increases in selenium associated with  
38 restoration activities. This effect would be addressed through the implementation of *AMM27*  
39 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
40 provide specific tidal habitat restoration design elements to reduce the potential for  
41 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
42 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
43 evaluated separately for each restoration effort as part of design and implementation. This  
44 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
45 design schedule.

1 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
2 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,  
3 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
4 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,  
5 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
6 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
7 *Impacts on Rookeries*, would be available to address potential effects on nesting individuals in  
8 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of  
9 cormorants, herons, and egrets to selenium. This effect would be addressed through the  
10 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
11 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
12 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
13 floodplain restoration could result in increased exposure of cormorants, herons or egrets to  
14 methylmercury through the ingestion of fish in restored tidal areas. However, it is unknown what  
15 concentrations of methylmercury are harmful to these species and the potential for increased  
16 exposure varies substantially within the study area. Site-specific restoration plans that address the  
17 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
18 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
19 area and better inform potential impacts on cormorants, herons, and egrets. The site-specific  
20 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
21 of methylmercury exposure for cormorants, herons, and egrets once site specific sampling and other  
22 information could be developed.

23 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
24 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
25 than significant with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
26 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, Mitigation Measure BIO-117, *Avoid*  
27 *Impacts on Rookeries*, and AMM1–AMM7. The implementation of tidal natural communities  
28 restoration or floodplain restoration could result in increased exposure of cormorants, herons or  
29 egrets to methylmercury, through the ingestion of fish in tidally restored areas. However, it is  
30 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
31 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
32 adaptive management as described in CM12 would address the potential impacts of methylmercury  
33 levels in restored tidal marsh in the study area on cormorants, herons, and egrets. Tidal habitat  
34 restoration could result in increased exposure of cormorants, herons, and egrets to selenium. This  
35 effect would be addressed through the implementation of *AMM27 Selenium Management* which  
36 would provide specific tidal habitat restoration design elements to reduce the potential for  
37 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
38 Alternative 1A implementation would not have a significant impact on cormorants, herons, and  
39 egrets.

40 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
41 **Disturbance of Nesting Birds**

42 See Mitigation Measure BIO-75 under Impact BIO-75.

1           **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

2           Hérons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);  
3           therefore, DWR will avoid all direct and indirect impacts on rookeries.

4           **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**  
5           **of Implementation of Conservation Components**

6           Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
7           duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,  
8           herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect  
9           on breeding habitat because trees in which nest sites are situated already withstand floods, the  
10          increase in inundation frequency and duration is expected to remain within the range of tolerance of  
11          riparian trees, and nest sites are located above floodwaters.

12          Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
13          inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall  
14          effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for  
15          these species, because, historically, flooding was the main natural disturbance regulating ecological  
16          processes in riparian areas, and flooding promotes the germination and establishment of many  
17          native riparian plants.

18          **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
19          sites because trees in which nest sites are situated already withstand floods, the increase in  
20          inundation frequency and duration is expected to remain within the range of tolerance of riparian  
21          trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic  
22          inundation from CM2 and CM5 would not result in an adverse effect on cormorants, herons and  
23          egrets.

24          **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
25          nest sites because trees in which nest sites are situated already withstand floods, the increase in  
26          inundation frequency and duration is expected to remain within the range of tolerance of riparian  
27          trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic  
28          inundation from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and  
29          egrets.

30          **Short-Eared Owl and Northern Harrier**

31          This section describes the effects of Alternative 1A, including water conveyance facilities  
32          construction and implementation of other conservation components, on short-eared owl and  
33          northern harrier. Modeled habitat for short-eared owl and northern harrier include tidal brackish  
34          and freshwater emergent wetland, nontidal freshwater perennial emergent wetland, managed  
35          wetland, other natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex,  
36          and selected cultivated lands.

37          Construction and restoration associated with Alternative 1A conservation measures would result in  
38          both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier  
39          as indicated in Table 12-1A-46. Full implementation of Alternative 1A would include the following  
40          conservation actions over the term of the BDCP which would also benefit short-eared owl and  
41          northern harrier (BDCP Chapter 3, *Conservation Strategy*).

- 1 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
2 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
3 with CM4).
- 4 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,  
5 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 6 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
7 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
8 associated with CM10).
- 9 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
10 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
11 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 12 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 13 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
14 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 15 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
16 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 17 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
18 VPNC2.5, and GNC2.4, associated with CM11).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
20 management activities that would enhance habitat for these species and implementation of AMM1-  
21 AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on short-eared owl  
22 and northern harrier would not be adverse for NEPA purposes and would be less than significant for  
23 CEQA purposes.

1 **Table 12-1A-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated with**  
2 **Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting and Foraging	1,707	1,707	876	876	NA	NA
<b>Total Impacts CM1</b>		<b>1,707</b>	<b>1,707</b>	<b>876</b>	<b>876</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting and Foraging	12,281	46,700	471	1,224	2,926-8,060	5,978
<b>Total Impacts CM2-CM18</b>		<b>12,281</b>	<b>46,700</b>	<b>471</b>	<b>1,224</b>	<b>2,926-8,060</b>	<b>5,978</b>
<b>TOTAL IMPACTS</b>		<b>13,988</b>	<b>48,407</b>	<b>1,347</b>	<b>2,100</b>	<b>2,926-8,060</b>	<b>5,978</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**  
5 **and Northern Harrier**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 50,507 acres of modeled habitat for short-eared owl and northern harrier (48,407 acres of  
8 permanent loss 2,100 acres of temporary loss, Table 12-1A-46). Conservation measures that would  
9 result in these losses are conveyance facilities and transmission line construction, and establishment  
10 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
11 restoration (CM4), floodplain restoration (CM5), grassland restoration (CM8), vernal pool and  
12 wetland restoration (CM9), marsh restoration (CM10) and construction of conservation hatcheries  
13 (CM18). The majority of habitat loss would result from CM4. Habitat enhancement and management  
14 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,  
15 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
16 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
17 degrade or eliminate short-eared owl and northern harrier modeled habitat. Each of these  
18 individual activities is described below. A summary statement of the combined impacts and NEPA  
19 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
21 result in the combined permanent and temporary loss of up to 2,583 acres of modeled short-  
22 eared owl and northern harrier habitat (1,707 acres of permanent loss, 876 acres of temporary  
23 loss) from CZs 3-6 and CZ 8. Activities that would impact modeled habitat consist of tunnel,  
24 forebay, and intake construction, temporary access roads, and construction of transmission



1 lines. The majority of habitat removed would consist of grassland and alfalfa fields. There are no  
2 occurrences of nesting short-eared owl and northern harrier that overlap with the construction  
3 footprint of CM1. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
4 *Avoid Disturbance of Nesting Birds* would require preconstruction surveys and the establishment  
5 of no-disturbance buffers and would be available to address potential effects on short-eared  
6 owls and northern harriers if they were to nest in or adjacent to construction activities. Refer to  
7 the Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.  
8 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
10 would permanently remove 1,021 acres of modeled short-eared owl and northern harrier  
11 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily  
12 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is  
13 expected to occur during the first 10 years of Plan implementation.
- 14 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
15 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl  
16 and northern harrier habitat. The majority of the losses would be managed wetlands and  
17 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would  
18 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas  
19 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,  
20 although existing nesting habitat for short-eared owl and northern harrier would be removed,  
21 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by  
22 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known  
23 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River  
24 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for *CM4*  
25 *Tidal Natural Communities Restoration*. However, this is an important breeding area for short-  
26 eared owl and if restoration footprints were changed during the implementation process of  
27 BDCP to overlap with this area, the effects on breeding short-eared owls could likely be adverse.  
28 Future NEPA and CEQA analysis would be conducted for restoration projects under BDCP and if  
29 restoration was proposed to occur outside of the hypothetical footprints used for this  
30 programmatic analysis, potential impacts on these species would be captured in the project-  
31 level analysis (Appendix 3B, Section 3.2.5).
- 32 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
33 seasonally inundated floodplain would permanently and temporarily remove approximately  
34 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754  
35 temporary). These losses would be expected to occur along the San Joaquin River and other  
36 major waterways in CZ 7.
- 37 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
38 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal  
39 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 40 • *CM8 Grassland Natural Community Restoration* Restoration of grassland is expected to be  
41 implemented on agricultural lands and would result in the conversion of 1,066 acres of  
42 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland  
43 would provide habitat for short-eared owl and northern harrier.
- 44 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
45 actions included in CM11 that are designed to enhance wildlife values in restored or protected

1 habitats could result in localized ground disturbances that could temporarily remove small  
2 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
3 vegetation and road and other infrastructure maintenance activities, would be expected to have  
4 minor adverse effects on available habitat and would be expected to result in overall  
5 improvements to and maintenance of habitat values over the term of the BDCP.

6 Habitat management- and enhancement-related activities could short-eared owl and northern  
7 harrier nests. If either species were to nest in the vicinity of a worksite, equipment operation  
8 could destroy nests, and noise and visual disturbances could lead to their abandonment,  
9 resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction*  
10 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize  
11 these potential effects.

- 12 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-  
13 eared owl and northern harrier habitat for the development of a delta and longfin smelt  
14 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan  
15 implementation.
- 16 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
17 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
18 disturbances that could affect short-eared owl and northern harrier use of the surrounding  
19 habitat. Maintenance activities would include vegetation management, levee and structure  
20 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
21 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described  
22 below.
- 23 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
24 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in  
25 the Plan Area, because they would be expected to avoid contact with construction and other  
26 equipment. If either species were to nest in the construction area, construction-related  
27 activities, including equipment operation, noise and visual disturbances could destroy nests or  
28 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
29 75 would be available to address these potential effects.

30 The following paragraphs summarize the combined effects discussed above and describe other  
31 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
32 included.

### 33 ***Near-Term Timeframe***

34 Because water conveyance facilities construction is being evaluated at the project level, the near-  
35 term BDCP conservation strategy has been evaluated to determine whether it would provide  
36 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
37 construction would not be adverse under NEPA. The Plan would remove 15,537 acres of modeled  
38 habitat (14,293 permanent, 1,244 temporary) for short-eared owl and northern harrier in the study  
39 area in the near-term. These effects would result from the construction of the water conveyance  
40 facilities (CM1, 2,583 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
41 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
42 *Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
43 *Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation Hatcheries—*  
44 *12,752 acres*).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
2 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
3 would indicate that 2,583 acres of habitat should be restored and 2,583 acres should be protected to  
4 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
5 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
6 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
7 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 2:1 for  
8 protection).

9 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
11 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
12 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
13 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
14 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the  
15 construction and early restoration losses.

16 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
17 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
18 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
19 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
20 would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the  
21 effects of current levels of habitat fragmentation. Small mammal populations would also be  
22 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
23 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
24 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
25 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
26 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
27 reserve system which would provide additional foraging habitat and a source of rodent prey that  
28 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
29 (including upland grassland components) would preserve habitat for short-eared owl and northern  
30 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
31 objective would focus on highly degraded areas in order to provide the greatest possible level of  
32 enhancement benefit to the managed wetland natural community and associated species. Managed  
33 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently  
34 supports a high concentration of nesting short-eared owls on Grizzley Island.

35 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
36 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
37 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
38 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
39 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
40 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
41 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
42 estimate for the proportion of cultivated lands protected in the near-term time period which would  
43 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These  
44 biological goals and objectives would inform the near-term protection and restoration efforts and  
45 represent performance standards for considering the effectiveness of restoration actions.

1 The acres of protection and restoration contained in the near-term Plan goals satisfy the typical  
2 mitigation ratios that would be applied to the project-level effects of CM1 and the near-term effects  
3 of other conservation actions. The impacts from other near-term conservation actions would be  
4 compensated for with tidal and grassland restoration and some portion of the protection of  
5 cultivated lands, in addition to management activities initiated through *CM3* and *CM11*.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
10 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
11 minimize the risk of affecting habitats and species adjacent to work areas and disposal sites. The  
12 AMMs are described in detail in BDCP Appendix 3.C. Short-eared owl and northern harrier are not  
13 covered species under the BDCP. In order for the BDCP to have a less than adverse effect on  
14 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
15 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
16 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

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

18 The study area supports approximately 406,784 acres of modeled habitat for short-eared owl and  
19 northern harrier. Alternative 1A as a whole would result in the permanent loss of and temporary  
20 effects on 50,507 acres of modeled short-eared owl and northern harrier habitat during the term of  
21 the Plan (12% of the modeled habitat in the study area). The locations of these losses are described  
22 above in the analyses of individual conservation measures.

23 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
24 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Communities*  
25 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
26 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
27 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
28 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
29 Chapter 3).

30 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
31 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
32 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
33 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
34 would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the  
35 effects of current levels of habitat fragmentation. Small mammal populations would also be  
36 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
37 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
38 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
39 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
40 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
41 reserve system which would provide additional foraging habitat and a source of rodent prey that  
42 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
43 (including upland grassland components) would preserve habitat for short-eared owl and northern  
44 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this

1 objective would focus on highly degraded areas in order to provide the greatest possible level of  
2 enhancement benefit to the managed wetland natural community and associated species. Managed  
3 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
4 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
5 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
6 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
7 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
8 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
9 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
10 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
11 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
16 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
17 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
18 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Short-eared owl  
19 and northern harrier are not species that are covered under the BDCP. For the BDCP not to have an  
20 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
21 required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
23 address this effect.

24 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential for direct  
25 mortality of these special-status species under Alternative 1A would represent an adverse effect in  
26 the absence of other conservation actions. With habitat protection and restoration associated with  
27 CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would  
28 be in place throughout the construction period, the effects of habitat loss resulting from Alternative  
29 1A would not be adverse. Short-eared owl and northern harrier are not covered species under the  
30 BDCP and preconstruction surveys for noncovered avian species would be required to ensure that  
31 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address the effect  
32 of direct mortality on short-eared owl and northern harrier.

### 33 **CEQA Conclusion:**

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

35 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
36 term BDCP conservation strategy has been evaluated to determine whether it would provide  
37 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
38 construction would be less than significant. The Plan would remove 15,537 acres of modeled habitat  
39 (14,293 permanent, 1,244 temporary) for short-eared owl and northern harrier in the study area in  
40 the near-term. These effects would result from the construction of the water conveyance facilities  
41 (CM1, 2,583 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
42 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
43 *Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*  
44 *Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation Hatcheries—12,752 acres*).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
2 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
3 would indicate that 2,583 acres of habitat should be restored and 2,583 acres should be protected to  
4 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
5 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
6 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
7 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 2:1 for  
8 protection).

9 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
11 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
12 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
13 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
14 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the  
15 construction and early restoration losses.

16 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
17 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
18 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
19 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
20 would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the  
21 effects of current levels of habitat fragmentation. Small mammal populations would also be  
22 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
23 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
24 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
25 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
26 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
27 reserve system which would provide additional foraging habitat and a source of rodent prey that  
28 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
29 (including upland grassland components) would preserve habitat for short-eared owl and northern  
30 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
31 objective would focus on highly degraded areas in order to provide the greatest possible level of  
32 enhancement benefit to the managed wetland natural community and associated species. Managed  
33 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently  
34 supports a high concentration of nesting short-eared owls on Grizzley Island.

35 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
36 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
37 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
38 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
39 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
40 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
41 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
42 estimate for the proportion of cultivated lands protected in the near-term time period which would  
43 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These  
44 biological goals and objectives would inform the near-term protection and restoration efforts and  
45 represent performance standards for considering the effectiveness of restoration actions.

1 The acres of protection and restoration contained in the near-term Plan goals satisfy the typical  
2 mitigation ratios that would be applied to the project-level effects of CM1 and the near-term effects  
3 of other conservation actions. The impacts from other near-term conservation actions would be  
4 compensated for with tidal and grassland restoration and some portion of the protection of  
5 cultivated lands, in addition to management activities initiated through CM3 and CM11. The Plan  
6 also includes commitments to implement AMM1 Worker Awareness Training, AMM2 Construction  
7 Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4  
8 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan,  
9 AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, and AMM7  
10 Barge Operations Plan. All of these AMMs include elements that avoid or minimize the risk of  
11 affecting habitats and species adjacent to work areas and disposal sites. The AMMs are described in  
12 detail in BDCP Appendix 3.C. Short-eared owl and northern harrier are not covered species under  
13 the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction  
14 surveys for noncovered avian species would be required to ensure that nests are detected and  
15 avoided. The implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
16 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce impacts on nesting short-eared owl  
17 and northern harrier to a less-than-significant level.

#### 18 **Late Long-Term Timeframe**

19 The study area supports approximately 406,784 acres of modeled habitat for short-eared owl and  
20 northern harrier. Alternative 1A as a whole would result in the permanent loss of and temporary  
21 effects on 50,507 acres of modeled short-eared owl and northern harrier habitat during the term of  
22 the Plan (12% of the modeled habitat in the study area). The locations of these losses are described  
23 above in the analyses of individual conservation measures.

24 The Plan includes conservation commitments through CM3 *Natural Communities Protection and*  
25 *Restoration*, CM4 *Tidal Natural Communities Restoration*, and CM8 *Grassland Natural Communities*  
26 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
27 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
28 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
29 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
30 Chapter 3).

31 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
32 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
33 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
34 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
35 would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the  
36 effects of current levels of habitat fragmentation. Small mammal populations would also be  
37 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
38 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
39 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
40 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
41 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
42 reserve system which would provide additional foraging habitat and a source of rodent prey that  
43 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
44 (including upland grassland components) would preserve habitat for short-eared owl and northern  
45 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this

1 objective would focus on highly degraded areas in order to provide the greatest possible level of  
2 enhancement benefit to the managed wetland natural community and associated species. Managed  
3 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
4 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
5 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
6 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
7 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
8 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
9 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
10 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
11 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
13 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
14 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
15 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
16 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
17 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
18 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Short-eared owl*  
19 *and northern harrier are not species that are covered under the BDCP. For the BDCP to have a less-*  
20 *than-significant impact on individuals, preconstruction surveys for noncovered avian species would*  
21 *be required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75,*  
22 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would be*  
23 *reduce the impact to a less-than-significant level.*

24 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
25 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
26 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
27 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of  
28 Alternative 1A would not result in a substantial adverse effect through habitat modifications and  
29 would not substantially reduce the number or restrict the range of either species. Therefore, the loss  
30 of habitat or potential mortality under this alternative would have a less-than-significant impact on  
31 short-eared owl and northern harrier.

32 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
33 **Disturbance of Nesting Birds**

34 See Mitigation Measure BIO-75 under Impact BIO-75.

35 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**  
36 **Transmission Facilities**

37 New transmission lines would increase the risk that short-eared owl and northern harrier could be  
38 subject to power line strikes, which could result in injury or mortality of these species. Short-eared  
39 owl and northern harrier would be at low risk of bird strike mortality based on factors assessed in  
40 the bird strike vulnerability analysis (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
41 *Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new transmission  
42 lines and the flight behavior of species. The existing network of transmission lines in the Plan Area  
43 currently poses the same small risk for these species, and any incremental risk associated with the



1 new power line corridors would also be expected to be low. *AMM20 Greater Sandhill Crane*, would  
2 further reduce any potential effects.

3 **NEPA Effects:** New transmission lines would minimally increase the risk for short-eared owl and  
4 northern harrier power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
5 potential effect of the construction of new transmission lines on short-eared owl and northern  
6 harrier would not be adverse.

7 **CEQA Conclusion:** New transmission lines would minimally increase the risk for short-eared owl  
8 and northern harrier power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
9 impact of the construction of new transmission lines on short-eared owl and northern harrier to a  
10 less-than-significant level.

### 11 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern** 12 **Harrier**

13 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
14 with construction-related activities could result in temporary disturbances that affect short-eared  
15 owl and northern harrier use of modeled habitat. Construction noise above background noise levels  
16 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
17 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
18 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
19 which these noise levels could affect short-eared owl or northern harrier. Indirect effects associated  
20 with construction include noise, dust, and visual disturbance caused by grading, filling, contouring,  
21 and other ground-disturbing operations. Construction-related noise and visual disturbances could  
22 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
23 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
24 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize  
25 potential effects on active nests. The use of mechanical equipment during water conveyance  
26 construction could cause the accidental release of petroleum or other contaminants that could affect  
27 these species or their prey in the surrounding habitat. AMM1–AMM7, including, *AMM2 Construction*  
28 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills. The  
29 inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern  
30 harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that  
31 measures are in place to prevent runoff from the construction area and the negative effects of dust  
32 on wildlife adjacent to work areas.

33 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
34 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)  
35 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
36 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
37 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
38 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
39 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
40 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
41 specific effects. Increased methylmercury associated with natural community and floodplain  
42 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower tropic  
43 levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

1 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
2 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
3 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
4 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
5 adaptive management as described in CM12 would be available to address the uncertainty of  
6 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and  
7 northern harrier.

8 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
9 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
10 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
11 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
12 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
13 classes within a species. In addition, the effect of selenium on a species can be confounded by  
14 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
15 2009).

16 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
17 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
18 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
19 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
20 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
21 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
22 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
23 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
24 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
25 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
26 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
27 levels of selenium have a higher risk of selenium toxicity.

28 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
29 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
30 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern  
31 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
32 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
33 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
34 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
35 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
36 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
37 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
38 alternative. However, it is difficult to determine whether the effects of potential increases in  
39 selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)  
40 would lead to adverse effects on short-eared owl and northern harrier.

41 Because of the uncertainty that exists at this programmatic level of review, there could be a  
42 substantial effect on short-eared owl and northern harrier from increases in selenium associated  
43 with restoration activities. This effect would be addressed through the implementation of *AMM27*  
44 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
45 provide specific tidal habitat restoration design elements to reduce the potential for

1 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
2 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
3 evaluated separately for each restoration effort as part of design and implementation. This  
4 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
5 design schedule.

6 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
7 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.  
8 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
9 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-  
10 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*  
11 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
12 address potential effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat  
13 restoration could result in increased exposure of short-eared owl and northern harrier. This effect  
14 would be addressed through the implementation of *AMM27 Selenium Management*, which would  
15 provide specific tidal habitat restoration design elements to reduce the potential for  
16 bioaccumulation of selenium and its bioavailability in tidal habitats.

17 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern  
18 harrier through increased exposure to methylmercury, as these species currently nest and forage in  
19 tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
20 concentrations of methylmercury are harmful to the species and the potential for increased  
21 exposure varies substantially within the study area. Site-specific restoration plans in addition to  
22 monitoring and adaptive management, described in CM12 *Methylmercury Management*, would  
23 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning  
24 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
25 methylmercury exposure for California least tern, once site specific sampling and other information  
26 could be developed.

27 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
28 operations and maintenance of the water conveyance facilities would have a less-than-significant  
29 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure  
30 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds* and  
31 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl  
32 and northern harrier through increased exposure to methylmercury, as these species currently nest  
33 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown  
34 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans  
35 that address the creation and mobilization of mercury, as well as monitoring and adaptive  
36 management as described in CM12 would better inform potential impacts and address the  
37 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat  
38 restoration could result in increased exposure of short-eared owl and northern harrier. This effect  
39 would be addressed through the implementation of *AMM27 Selenium Management* which would  
40 provide specific tidal habitat restoration design elements to reduce the potential for  
41 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
42 Alternative 1A implementation would not have a significant impact on short-eared owl and northern  
43 harrier.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**  
5           **Result of Implementation of Conservation Components**

6           Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
7           *Enhancement*) would increase the frequency and duration of inundation on approximately 946–  
8           2,445 acres of modeled short-eared owl and northern harrier habitat (Table 12-1A-46).

9           Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
10           *Restoration* could result in the periodic inundation of up to approximately 2,878 acres of modeled  
11           habitat (Table 12-1A-46), the majority of which would be pasture and other cultivated lands.

12           Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
13           season due to periodic inundation. However, inundation would occur during the nonbreeding  
14           season and would not be expected to have an adverse effect on either species.

15           **NEPA Effects:** Increased frequency and duration of inundation of short-eared owl and northern  
16           harrier habitat as a result of CM2 and CM5 implementation would not have an adverse effect  
17           because inundation would occur during the nonbreeding season.

18           **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-  
19           eared owl and northern harrier because inundation is expected to occur prior to the breeding  
20           season.

21           **Redhead and Tule Greater White-Fronted Goose**

22           Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are  
23           discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178  
24           through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be  
25           found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

26           **Mountain Plover**

27           This section describes the effects of Alternative 1A, including water conveyance facilities  
28           construction and implementation of other conservation components, on mountain plover. Modeled  
29           habitat for mountain plover include grassland, alkali seasonal wetland, vernal pool complex, alfalfa,  
30           grain and hay, pasture, and idle cropland throughout the study area.

31           Construction and restoration associated with Alternative 1A conservation measures would result in  
32           both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table  
33           12-1A-47. Full implementation of Alternative 1A would include the following biological objectives  
34           over the term of the BDCP which would also benefit the mountain plover (BDCP Chapter 3,  
35           *Conservation Strategy*).

- 36           ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
37           acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
38           among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 39           ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).

- 1 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
2 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 3 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
4 VPNC2.5, GNC2.4, associated with CM11).
- 5 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
6 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 7 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
8 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value  
9 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

10 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
11 management activities that would enhance these natural communities for the species, impacts on  
12 mountain plover would not be adverse for NEPA purposes and would be less than significant for  
13 CEQA purposes.

14 **Table 12-1A-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 1A**  
15 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Wintering	1,660	1,660	673	673	NA	NA
<b>Total Impacts CM1</b>		<b>1,660</b>	<b>1,660</b>	<b>673</b>	<b>673</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Wintering	5,450	26,198	376	893	1,158–3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158–3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>7,110</b>	<b>27,858</b>	<b>1,049</b>	<b>1,566</b>	<b>1,158–3,650</b>	<b>3,823</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

16

17 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

18 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
19 of up to 29,424 acres of modeled habitat for mountain plover (27,858 acres of permanent loss and  
20 1,566 of temporary loss, Table 12-1A-47). Conservation measures that would result in these losses  
21 are conveyance facilities and transmission line construction, and establishment and use of borrow  
22 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),  
23 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool

1 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
2 conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4.  
3 Habitat enhancement and management activities (CM11), which include ground disturbance or  
4 removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities,  
5 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
6 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
7 degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities  
8 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
9 conclusion follows the individual conservation measure discussions.

- 10 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
11 result in the combined permanent and temporary loss of up to 2,333 acres of modeled mountain  
12 plover habitat (1,660 acres of permanent loss, 673 acres of temporary loss) from CZs 3–6 and CZ  
13 8. The majority of habitat affected would be cultivated lands and grassland that would be  
14 removed from CZ 8, from the construction of the new forebay and the potential borrow and  
15 spoils site southwest of the proposed forebay. Some of the grassland habitat lost in CZ 8 is  
16 composed of larger stands of ruderal and herbaceous vegetation and California annual  
17 grassland, which provides wintering habitat for the species. There are no CNDDDB occurrences of  
18 mountain plover that intersect with the CM1 footprint. However, the study area does overlap  
19 with the species' winter range, and there are occurrences west and north of the study area.  
20 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1A construction  
21 locations. Impacts from CM1 would occur within the first 10 years of Alternative 1A  
22 implementation.
- 23 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
24 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
25 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in  
26 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.  
27 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,  
28 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek  
29 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new  
30 channel is constructed. The loss is expected to occur during the first 10 years of Plan  
31 implementation.
- 32 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
33 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover  
34 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or  
35 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the  
36 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to  
37 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment  
38 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area  
39 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat  
40 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun  
41 Marsh.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
43 seasonally inundated floodplain would permanently and temporarily remove approximately  
44 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses  
45 would be expected after the first 10 years of Alternative 1A implementation along the San  
46 Joaquin River and other major waterways in CZ 7.

- 1       • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
2       approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and  
3       1,489 acres of habitat as part of seasonal floodplain restoration.
- 4       • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
5       *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
6       result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
7       would be restored after the construction periods. Grassland restoration would be implemented  
8       on agricultural lands that also provide wintering habitat for mountain plover and would result  
9       in the conversion of 837 acres of cultivated lands to grassland.
- 10      • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
11      removal of 705 acres of mountain plover habitat.
- 12      • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
13      actions included in CM11 that are designed to enhance wildlife values in restored or protected  
14      habitats could result in localized ground disturbances that could temporarily remove small  
15      amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative  
16      vegetation and road and other infrastructure maintenance activities, would be expected to have  
17      minor adverse effects on available mountain plover habitat. CM11 would also include the  
18      construction of recreational-related facilities including trails, interpretive signs, and picnic  
19      tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of  
20      trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
21      disturbed areas when and where possible. However, approximately 50 acres of grassland  
22      habitat would be lost from the construction of trails and facilities.
- 23      • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
24      modeled mountain plover habitat for the development of a delta and longfin smelt conservation  
25      hatchery in CZ 1.
- 26      • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
27      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
28      disturbances that could affect mountain plover use of the surrounding habitat. Maintenance  
29      activities would include vegetation management, levee and structure repair, and re-grading of  
30      roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7  
31      and conservation actions as described below.
- 32      • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
33      mountain plover because foraging individuals would be expected to temporarily avoid the  
34      increased noise and activity associated with construction areas.

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

### 38      ***Near-Term Timeframe***

39      Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40      the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41      provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
42      effects of construction would not be adverse under NEPA. The Plan would remove 8,167 acres  
43      (7,110 permanent, 1,049 temporary) of modeled mountain plover wintering habitat in the study

1 area in the near-term. These effects would result from the construction of the water conveyance  
2 facilities (CM1, 2,333 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
3 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
4 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
5 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
6 and *CM18 Conservation Hatcheries*—5,826 acres).

7 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
8 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be  
9 protected to compensate for the CM1 losses of 2,333 acres of mountain plover wintering habitat.  
10 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
11 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
12 NEPA and CEQA ratio (2:1 for protection).

13 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
14 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
15 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
16 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
17 in the same timeframe as the construction and early restoration losses thereby avoiding adverse  
18 effects of habitat loss on mountain plover wintering in the study area. Grassland restoration and  
19 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
20 protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland  
21 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
22 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand  
23 mountain plover wintering habitat and reduce the effects of current levels of habitat fragmentation.  
24 Under *CM11 Natural Communities Enhancement and Management*, insect prey populations would be  
25 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
26 ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other  
27 native wildlife species would provide approximately 15,400 acres of potential wintering habitat for  
28 mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late  
29 long-term time period would be in alfalfa and pasture crop types (very high- and high-value crop  
30 types for Swainson's hawk (Objective SH1.2) which are also modeled habitat for wintering mountain  
31 plover. This biological objective provides an estimate for the high proportion of cultivated lands  
32 protected in the near-term time period which would be suitable for mountain plover.

33 The acres of restoration and protection contained in the near-term Plan goals and the additional  
34 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
35 level effects of CM1 on mountain plover, as well as mitigate the near-term effects of the other  
36 conservation measures with the consideration that some portion of the 15,400 acres of cultivated  
37 lands protected in the near-term timeframe would be managed in suitable crop types to compensate  
38 for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-125, *Compensate for the Near-Term*  
39 *Loss of Mountain Plover Wintering Habitat*, would be available to address the effect of habitat loss in  
40 the near-term.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, Reusable Tunnel Material, and Dredged  
45 Material, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or



1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

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

4 Based on the habitat model, the study area supports approximately 269,411 acres of potential  
5 habitat for mountain plover. Alternative 1A as a whole would result in the permanent loss of and  
6 temporary effects on 29,424 acres of modeled mountain plover wintering habitat during the term of  
7 the Plan. The locations of these losses are described above in the analyses of individual conservation  
8 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
9 *Protection and Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9 Vernal Pool*  
10 *and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
11 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
12 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
13 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
14 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, CZ  
15 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland complexes  
16 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali  
17 seasonal wetland, and vernal pool natural communities which would expand habitat for mountain  
18 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*  
19 *Communities Enhancement and Management*, insect prey populations would be increased on  
20 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
21 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife  
22 species would provide approximately 15,400 acres of potential wintering habitat for mountain  
23 plover (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in  
24 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
25 SH1.2) which would also provide potential wintering habitat for mountain plover. The Plan also  
26 includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best*  
27 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*  
28 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*  
29 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, and *AMM7 Barge*  
30 *Operations Plan*. All of these AMMs include elements that would avoid or minimize the risk of  
31 affecting individuals and species habitats adjacent to work areas. The AMMs are described in detail  
32 in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

33 **NEPA Effects:** The loss of mountain plover habitat and potential for mortality of this special-status  
34 species under Alternative 1A would represent an adverse effect in the absence of other conservation  
35 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided  
36 by biological goals and objectives and by AMM1–AMM7, which would be in place throughout the  
37 construction period, and with implementation of Mitigation Measure BIO-125, *Compensate for the*  
38 *Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss and potential direct  
39 mortality on mountain plover under Alternative 1A would not be adverse.

### 40 **CEQA Conclusion:**

#### 41 **Near-Term Timeframe**

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
44 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the

1 effects of construction would be less than significant under CEQA. The Plan would remove 8,167  
2 acres (7,110 permanent, 1,049 temporary) of modeled mountain plover wintering habitat in the  
3 study area in the near-term. These effects would result from the construction of the water  
4 conveyance facilities (CM1, 2,333 acres), and implementing other conservation measures (*CM2 Yolo*  
5 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
6 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
7 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
8 and *CM18 Conservation Hatcheries*—5,826 acres).

9 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
10 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be  
11 protected to compensate for the CM1 losses of 2,333 acres of mountain plover wintering habitat.  
12 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
13 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
14 NEPA and CEQA ratio (2:1 for protection).

15 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
16 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
17 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
18 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
19 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
20 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs  
21 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would  
22 be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
23 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
24 pool natural communities which would expand wintering habitat for mountain plover and reduce  
25 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
26 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
27 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
28 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
29 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective  
30 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would  
31 be in alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk  
32 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the  
33 study area. This biological objective provides an estimate for the high proportion of cultivated lands  
34 protected in the near-term time period which would provide habitat for mountain plover.

35 These Plan objectives represent performance standards for considering the effectiveness of  
36 conservation actions. The acres of restoration and protection contained in the near-term Plan goals  
37 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
38 applied to the project-level effects of CM1 on mountain plover, as well as mitigate the near-term  
39 effects of the other conservation measures with the consideration that some portion of the 15,400  
40 acres of cultivated lands protected in the near-term timeframe would be managed in suitable crop  
41 types to compensate for the loss of habitat at a ratio of 2:1. The implementation of Mitigation  
42 Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, would  
43 reduce the impact of habitat loss in the near-term to a less-than-significant level.

44 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
45 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
4 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
5 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

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

7 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 29,424  
8 acres of mountain plover habitat during the term of the Plan (11% of the total habitat in the study  
9 area). The locations of these losses are described above in the analyses of individual conservation  
10 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
11 *Protection and Restoration, CM8 Grassland Natural Communities Restoration, and CM9 Vernal Pool*  
12 *and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
13 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
14 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
15 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
16 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, CZ  
17 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland complexes  
18 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali  
19 seasonal wetland, and vernal pool natural communities which would expand wintering habitat for  
20 mountain plover and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
21 *Natural Communities Enhancement and Management*, insect prey populations would be increased on  
22 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
23 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife  
24 species would provide approximately 15,400 acres of potential habitat for mountain plover  
25 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
26 and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective SH1.2)  
27 which would also provide habitat for mountain plover.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
29 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
30 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
33 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
34 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

35 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
36 of new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
37 restoration activities, and with the implementation of AMM1-AMM7, and Mitigation Measure BIO-  
38 125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the loss of habitat or  
39 direct mortality through implementation of Alternative 1A would not result in a substantial adverse  
40 effect through habitat modifications and would not substantially reduce the number or restrict the  
41 range of mountain plover. Therefore, the loss of habitat or potential mortality under this alternative  
42 would have a less-than-significant impact on mountain plover.

1           **Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover**  
2           **Wintering Habitat**

3           DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
4           crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value  
5           habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland  
6           protection, enhancement, and management may be substituted for the protection of high-value  
7           cultivated lands.

8           **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission**  
9           **Facilities**

10          New transmission lines would increase the risk for bird-power line strikes, which could result in  
11          injury or mortality of mountain plover. Mountain plovers congregate in flocks during the winter and  
12          travel between grasslands and cultivated lands that provide foraging habitat for the species. This  
13          flocking behavior puts them at risk of collisions with powerlines. Existing transmission lines in the  
14          study area currently pose this risk. Plovers are primarily visual foragers and therefore, the risk for  
15          collision would be reduced by *AMM20 Greater Sandhill Crane*, which would require the installation  
16          of bird flight diverters on new and selected existing transmission lines in the study area.

17          **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover  
18          because mortality from powerline strikes would be minimized with the implementation of *AMM20*  
19          *Greater Sandhill Crane*, which would require the installation of bird flight diverters on new and  
20          selected existing transmission lines in the study area. The risk for bird-power line strikes is,  
21          therefore, not expected to have an adverse effect on mountain plover.

22          **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain  
23          plover because mortality from powerline strikes would be minimized with the implementation of  
24          *AMM20 Greater Sandhill Crane*, which would require the installation of bird flight diverters on new  
25          and selected existing transmission lines in the study area.

26          **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

27          Construction- and subsequent maintenance-related noise and visual disturbances could disrupt  
28          foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction  
29          noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from  
30          the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*  
31          *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
32          available data to determine the extent to which these noise levels could affect mountain plover.  
33          Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
34          grading, filling, contouring, and other ground-disturbing operations. The use of mechanical  
35          equipment during water conveyance facilities construction could cause the accidental release of  
36          petroleum or other contaminants that could affect these species or their prey in the surrounding  
37          habitat. AMM1–AMM7, would minimize the likelihood of such spills from occurring. The inadvertent  
38          discharge of sediment or excessive dust adjacent to mountain plover grassland habitat could also  
39          have a negative effect on the species. However, AMM1–AMM7 would also ensure that measures  
40          would be in place to prevent runoff from the construction area and the negative effects of dust on  
41          wildlife adjacent to work areas.

1 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 1A implementation could  
2 have adverse effects on the species through the modification of habitat. With the implementation of  
3 AMM1–AMM7, indirect effects as a result of Alternative 1A implementation would not have an  
4 adverse effect on mountain plover.

5 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 1A implementation  
6 could have a significant impact on the species from modification of habitat. With the With the  
7 implementation of AMM1–AMM7, indirect effects as a result of Alternative 1A implementation  
8 would have a less-than-significant impact on mountain plover.

9 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of**  
10 **Implementation of Conservation Components**

11 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
12 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
13 3,650 acres of modeled mountain plover foraging habitat (Table 12-1A-47).

14 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
15 *Restoration*, could result in the periodic inundation of up to approximately 3,823 acres of modeled  
16 habitat (Table 12-1A-47). Periodic inundation from CM2 and CM5 would not have an adverse effect  
17 on mountain plover because birds would be expected to move to adjacent foraging habitat.

18 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
19 plover foraging habitat. However, periodic inundation would not have an adverse effect on  
20 mountain plover because birds would be expected to move to adjacent foraging habitat.

21 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
22 plover foraging habitat. However, periodic inundation would have a less-than-significant impact on  
23 mountain plover because birds would be expected to move to adjacent foraging habitat.

24 **Black Tern**

25 This section describes the effects of Alternative 1A, including water conveyance facilities  
26 construction and implementation of other conservation components, on black tern. Modeled nesting  
27 habitat for black tern in the study area is currently limited to rice in CZ 2.

28 Construction and restoration associated with Alternative 1A conservation measures would result in  
29 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-1A-  
30 48. Full implementation of Alternative 1A would include the following biological objectives over the  
31 term of the BDCP which would also benefit the black tern (BDCP Chapter 3, *Conservation Strategy*).

- 32 ● Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand  
33 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,  
34 associated with CM3).
- 35 ● Protect up to 1,700 acres of rice land or equivalent habitat (e.g. perennial wetland) in the Yolo  
36 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by Species*  
37 for giant garter snake. Any remaining acreage (from a total 2,740 acre commitment) will consist  
38 of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5 (Objective  
39 GGS3.1, associated with CM3).

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 2 management activities that would enhance this habitat for the species and implementation of  
 3 AMM1-AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA  
 4 purposes and would be less than significant for CEQA purposes.

5 **Table 12-1A-48. Changes in Black Tern Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	76	260	0	0	791-1,582	0
<b>Total Impacts CM2-CM18</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791-1,582</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791-1,582</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

6

7 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

8 Alternative 1A conservation measures would result in the permanent loss of up to 260 acres of  
 9 modeled nesting habitat for black tern, consisting of rice in CZ 2 (Table 12-1A-48). Conservation  
 10 measures that would result in these losses are grassland restoration (CM8) and nontidal marsh  
 11 restoration (CM10). Each of these individual activities is described below. A summary statement of  
 12 the combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation  
 13 measure discussions.

- 14 • *CM8 Grassland Natural Community Restoration:* Restoration of grassland is expected to be  
 15 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands  
 16 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in  
 17 the first 10 years.
- 18 • *CM10 Nontidal Marsh Restoration:* Implementation of CM10 would result in the permanent  
 19 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be  
 20 removed in the first 10 years.
- 21 • *CM11 Natural Communities Enhancement and Management:* A variety of habitat management  
 22 actions that are designed to enhance wildlife values in restored or protected habitats could  
 23 result in localized ground disturbances that could temporarily remove small amounts of  
 24 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road

1 and other infrastructure maintenance activities, would be expected to have minor adverse  
2 effects on available habitat and would be expected to result in overall improvements to and  
3 maintenance of habitat values over the term of the BDCP. Habitat management- and  
4 enhancement-related activities could disturb nesting black terns if they were to nest in the  
5 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual  
6 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The  
7 potential for these activities to result in direct mortality of black tern would be minimized with  
8 the implementation of and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
9 *Surveys and Avoid Disturbance of Nesting Birds*.

- 10 • Operations and Maintenance: Postconstruction operation and maintenance of the restoration  
11 infrastructure could result in ongoing but periodic disturbances that could affect black tern  
12 nesting adjacent to maintenance areas. Maintenance activities would include vegetation  
13 management, levee and structure repair, and re-grading of roads and permanent work areas.  
14 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and  
15 conservation actions as described below.
- 16 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
17 direct mortality of adult or fledged black tern individuals if they were present in the study area,  
18 because they would be expected to avoid contact with construction and other equipment. If  
19 black tern were to nest in the construction area, construction-related activities, including  
20 equipment operation, noise and visual disturbances could destroy nests or lead to their  
21 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and  
22 minimized with the implementation of Mitigation Measure BIO-75.
- 23 • Late season flooding in the Yolo Bypass could result in the loss of rice (nesting habitat for black  
24 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss  
25 of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*  
26 *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis  
27 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term  
28 timeframe. This potential impact is further described under Impact BIO-129c below.

29 The following paragraphs summarize the combined effects discussed above and describe other  
30 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
31 included.

### 32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
36 effects of construction would not be adverse under NEPA. There would be no impacts on black tern  
37 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,  
38 there would be a loss of 76 acres of modeled nesting habitat for black tern in the study area in the  
39 near-term. These effects would result from implementing *CM8 Grassland Natural Community*  
40 *Restoration* and *CM10 Nontidal Marsh Restoration*.

41 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
42 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
43 protected in CZ 2 to compensate for the losses of black tern nesting habitat.

1 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
2 equivalent habitat (Table 3-4 in Chapter 3). These conservation actions are associated with CM3 and  
3 would occur in the same timeframe as the early restoration losses. The BDCP also contains  
4 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to  
5 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria  
6 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3  
7 and GGS 3.1) by the late long-term time period. These objectives would inform the near-term  
8 protection actions, and therefore some portion of the 200 acres of rice and 700 acres of rice or  
9 equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term acreage  
10 commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black tern from  
11 habitat loss, protection of 76 acres of rice would need to occur in CZ 2 in the near-term timeframe.  
12 Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, would be available  
13 to address this effect.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
19 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
20 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
21 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,  
22 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
23 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
24 *Avoid Disturbance of Nesting Birds*, would be available to address this effect.

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

26 Alternative 1A as a whole would result in the permanent loss of 260 acres of modeled black tern  
27 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
28 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
29 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
30 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat  
31 for black tern in the northern part of the study area has largely been reduced to rice lands, and these  
32 acres would provide protected nesting habitat for the species.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
40 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,  
41 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
42 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
43 *Avoid Disturbance of Nesting Birds*, would be available to address this effect.

44 **NEPA Effects:** The loss of black tern nesting habitat and potential for mortality of this special-status  
45 species under Alternative 1A would represent an adverse effect in the absence of other conservation



1 actions. With habitat protection associated with CM3, guided by biological goals and objectives and  
2 by AMM1–AMM7, which would be in place throughout the construction period, the effects of habitat  
3 loss under Alternative 1A would not be adverse under NEPA. Black tern is not a covered species  
4 under the BDCP and the potential for mortality would be an adverse effect without preconstruction  
5 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
6 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
7 address this effect.

8 **CEQA Conclusion:**

9 **Near-term Timeframe**

10 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
11 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
12 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
13 effects of construction would be less than significant under CEQA. There would be no impacts on  
14 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).  
15 However, there would be a loss of 76 acres of modeled nesting habitat for black tern in the study  
16 area in the near-term. These effects would result from implementing *CM8 Grassland Natural*  
17 *Community Restoration* and *CM10 Nontidal Marsh Restoration*.

18 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
19 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
20 protected in CZ 2 to mitigate the losses of black tern nesting habitat.

21 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
22 equivalent habitat (Table 3-4 in Chapter 3). These conservation actions are associated with CM3 and  
23 would occur in the same timeframe as the early restoration losses. The BDCP also contains  
24 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to  
25 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria  
26 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3  
27 and GGS 3.1) by the late long-term time period. These objectives would inform the near-term  
28 protection actions, and therefore some portion of the 200 acres of rice and 700 acres of rice or  
29 equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term acreage  
30 commitment in the plan that is specific to CZ 2. Implementation of Mitigation Measure BIO-129a,  
31 *Compensate for Loss of Black Tern Nesting Habitat*, which would require 1:1 protection of habitat in  
32 CZ 2 in the near-term timeframe, would reduce this potential impact to a less-than-significant level.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
40 covered species under the BDCP. For the BDCP to have a less-than-significant impact on individuals,  
41 preconstruction surveys would be required to ensure that nests are detected and avoided.  
42 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
43 *Nesting Birds*, would reduce the potential impact on nesting black tern to a less-than-significant  
44 impact.

1 **Late Long-Term Timeframe**

2 Alternative 1A as a whole would result in the permanent loss of 260 acres of modeled black tern  
3 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
4 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
5 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
6 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
12 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
13 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
14 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,  
15 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
16 detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
17 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce the potential impact on  
18 nesting black tern to a less-than-significant level.

19 Considering Alternative 1A's protection provisions, which would provide acreages of new or  
20 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
21 and restoration activities, loss of habitat and direct mortality through implementation of Alternative  
22 1A would not result in a substantial adverse effect through habitat modifications and would not  
23 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
24 would have a less-than-significant impact on black tern.

25 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
26 **Disturbance of Nesting Birds**

27 See Mitigation Measure BIO-75 under Impact BIO-75.

28 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

29 Because there is no near-term acreage commitment associated with the protection of rice in CZ  
30 2, BDCP proponents must protect rice at a 1:1 ratio for each acre of rice impacted in CZ 2.

31 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

32 Construction noise above background noise levels (greater than 50 dBA) could extend 1,900 to  
33 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
34 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
35 are no available data to determine the extent to which these noise levels could affect black tern. If  
36 black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-  
37 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and  
38 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,  
39 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid  
40 the potential for adverse effects of construction-related activities on survival and productivity of  
41 nesting black terns. The use of mechanical equipment during restoration activities could cause the  
42 accidental release of petroleum or other contaminants that could affect black terns in the

1 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable  
2 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*  
3 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such  
4 spills and ensure that measures are in place to prevent runoff from the construction area and  
5 negative effects of dust on active nests.

6 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
7 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
8 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
9 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
10 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
11 classes within a species. In addition, the effect of selenium on a species can be confounded by  
12 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
13 2009).

14 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
15 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
16 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
17 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
18 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
19 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
20 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
21 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
22 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
23 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
24 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
25 levels of selenium have a higher risk of selenium toxicity.

26 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
27 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
28 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and  
29 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase  
30 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration  
31 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP  
32 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations  
33 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing  
34 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases  
35 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to  
36 determine whether the effects of potential increases in selenium bioavailability associated with  
37 restoration-related conservation measures (CM4–CM5) would lead to adverse effects on black tern.

38 Because of the uncertainty that exists at this programmatic level of review, there could be an effect  
39 on black tern from increases in selenium associated with restoration activities. This effect would be  
40 addressed through the implementation of *AMM27 Selenium Management* (BDCP Appendix 3.C,  
41 *Avoidance and Minimization Measures*) which would provide specific tidal habitat restoration design  
42 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
43 habitats. Furthermore, the effectiveness of selenium management to reduce selenium  
44 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as

1 part of design and implementation. This avoidance and minimization measure would be  
2 implemented as part of the tidal habitat restoration design schedule.

3 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components  
4 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
5 equipment for the construction of conservation components could cause the accidental release of  
6 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
7 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
8 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address potential effects  
9 on nesting individuals. Tidal habitat restoration could result in increased exposure of black tern to  
10 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
11 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
12 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

13 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components  
14 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
15 equipment for the construction of conservation components could cause the accidental release of  
16 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
17 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
18 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these impacts to a less-than-  
19 significant level. Tidal habitat restoration could result in increased exposure of black tern to  
20 selenium. This impact would be addressed through the implementation of *AMM27 Selenium*  
21 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
22 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

### 23 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of** 24 **Implementation of Conservation Components**

25 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat  
26 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season  
27 but could reduce the availability of nesting habitat during years that flooding extends into the  
28 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to  
29 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,  
30 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo  
31 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation  
32 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are  
33 provided in BDCP Appendix 5, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*  
34 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice  
35 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,  
36 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of  
37 rice would be protected in areas that are less susceptible to inundation, which would benefit the  
38 black tern during years in which the magnitude and duration of inundation were increased.

39 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for  
40 black tern. However, if flooding were to extend into the nesting season or were to significantly  
41 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect  
42 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under BDCP  
43 Objective GGS3.1.

1 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on  
2 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to  
3 significantly reduce rice production, it could also reduce suitable black tern nesting habitat. This  
4 potential impact would be reduced to a less-than-significant level by the creation and/or protection  
5 of 1,700 acres of rice in CZ 2 under BDCP Objective GGS3.1.

### 6 **California Horned Lark and Grasshopper Sparrow**

7 This section describes the effects of Alternative 1A, including water conveyance facilities  
8 construction and implementation of other conservation components, on California horned lark and  
9 grasshopper sparrow. The primary impact of concern for grasshopper sparrow and California  
10 horned lark would be the loss of nesting habitat in the Plan Area, which includes grassland, vernal  
11 pool complex, and alkali seasonal wetland natural communities and selected cultivated lands  
12 including grain and hay crops and pasture.

13 Construction and restoration associated with Alternative 1A conservation measures would result in  
14 both temporary and permanent losses of modeled breeding habitat for California horned lark and  
15 grasshopper sparrow as indicated in Table 12-1A-49. Full implementation of Alternative 1A would  
16 include the following biological objectives over the term of the BDCP which would also benefit the  
17 California horned lark and the grasshopper sparrow (BDCP Chapter 3, *Conservation Strategy*).

- 18 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
19 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
20 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 21 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 22 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
23 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 24 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
25 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 26 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
27 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
28 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 29 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
30 VPNC2.5, and GNC2.4, associated with CM11).

31 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
32 management activities that would enhance habitat for these species and implementation of AMM1-  
33 AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow  
34 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**  
2 **Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	1,660	1,660	673	673	NA	NA
<b>Total Impacts CM1</b>		<b>1,660</b>	<b>1,660</b>	<b>673</b>	<b>673</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Breeding	5,450	26,198	376	893	777–2,423	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>777–2,423</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>7,110</b>	<b>27,858</b>	<b>1,049</b>	<b>1,566</b>	<b>777–2,423</b>	<b>3,823</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**  
5 **Lark and Grasshopper Sparrow**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 29,424 acres of modeled nesting habitat for California horned lark and grasshopper sparrow  
8 (27,858 acres of permanent loss and 1,566 of temporary loss, Table 12-1A-49). Conservation  
9 measures that would result in these losses are conveyance facilities and transmission line  
10 construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries  
11 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian  
12 restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),  
13 nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The  
14 majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and  
15 management activities (CM11), which include ground disturbance or removal of nonnative  
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local  
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation  
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate  
19 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities  
20 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
21 conclusion follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities would  
23 result in the combined permanent and temporary loss of up to 2,333 acres of modeled California  
24 horned lark and grasshopper sparrow habitat (1,660 acres of permanent loss, 673 acres of  
25 temporary loss) from CZs 3–6 and CZ 8. The majority of habitat that would be removed would be  
26 in CZ 8, from the construction of the new forebay and from the potential borrow and spoils site

1 south of the proposed forebay. Some of this habitat south of Clifton Court Forebay is composed  
2 of larger stands of ruderal and herbaceous vegetation and California annual grassland, which is  
3 suitable nesting habitat for these species. Grasshopper sparrows were detected in DHCCP  
4 surveys south of Byron Highway in CZ 8 (1 occurrence) and east of Intakes 1 - 5 (6 occurrences),  
5 in the Stone Lakes NWR. However, the CM1 footprint does not overlap with any grasshopper  
6 sparrow or California horned lark occurrences. However, Mitigation Measure BIO-75, *Conduct*  
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require  
8 preconstruction surveys and the establishment of no-disturbance buffers and would be  
9 available to address potential effects on California horned larks and grasshopper sparrows if  
10 they were to nest in or adjacent to construction areas. Refer to the Terrestrial Biology Map Book  
11 for a detailed view of Alternative 1A construction locations. Impacts from CM1 would occur  
12 within the first 10 years of Alternative 1A implementation.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
14 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
15 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres  
16 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
17 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
18 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
19 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
20 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
21 years of Plan implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
23 inundation would permanently remove an estimated 20,880 acres of modeled California horned  
24 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated  
25 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache  
26 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and  
27 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
28 directly impact and fragment grassland just north of Rio Vista in and around French and  
29 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
30 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
31 the northern fringes of Suisun Marsh.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
33 seasonally inundated floodplain would permanently and temporarily remove approximately  
34 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933  
35 permanent, 517 temporary). These losses would be expected after the first 10 years of  
36 Alternative 1A implementation along the San Joaquin River and other major waterways in CZ 7.
- 37 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
38 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as  
39 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 40 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
41 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
42 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
43 would be restored after the construction periods. Grassland restoration would be implemented  
44 on agricultural lands that also provide nesting habitat for California horned lark and

1 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to  
2 grassland.

- 3 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
4 removal of 705 acres of California horned lark and grasshopper sparrow nesting habitat.
- 5 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
6 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
7 habitats could result in localized ground disturbances that could temporarily remove small  
8 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
9 vegetation and road and other infrastructure maintenance activities, would be expected to have  
10 minor adverse effects on available habitat and would be expected to result in overall  
11 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
12 also include the construction of recreational-related facilities including trails, interpretive signs,  
13 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
14 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
15 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
16 of grassland habitat would be lost from the construction of trails and facilities.

17 Habitat management- and enhancement-related activities could disturb California horned lark  
18 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,  
19 equipment operation could destroy nests, and noise and visual disturbances could lead to their  
20 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*  
21 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available  
22 to address these potential effects.

- 23 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
24 modeled California horned lark and grasshopper sparrow habitat for the development of a delta  
25 and longfin smelt conservation hatchery in CZ 1.
- 26 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
27 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
28 disturbances that could affect California horned lark and grasshopper sparrow use of the  
29 surrounding habitat. Maintenance activities would include vegetation management, levee and  
30 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
31 would be reduced by AMM1-AMM7, Mitigation Measure BIO-75, and conservation actions as  
32 described below.
- 33 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
34 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were  
35 present in the Plan Area, because they would be expected to avoid contact with construction and  
36 other equipment. If either species were to nest in the construction area, construction-related  
37 activities, including equipment operation, noise and visual disturbances could destroy nests or  
38 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
39 75 would be available to address these potential effects.

40 The following paragraphs summarize the combined effects discussed above and describe other  
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
42 included.



1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. The Plan would remove 8,167 acres  
6 (7,110 permanent, 1,049 temporary) of modeled breeding habitat for California horned lark and  
7 grasshopper sparrow in the study area in the near-term. These effects would result from the  
8 construction of the water conveyance facilities (CM1, 2,333 acres), and implementing other  
9 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
10 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
11 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
12 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

13 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
14 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be  
15 protected to compensate for the CM1 losses of 2,333 acres of California horned lark and  
16 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
17 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
18 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
19 (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
23 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
24 in the same timeframe as the construction and early restoration losses thereby avoiding adverse  
25 effects of habitat loss on California horned lark and grasshopper sparrow. Grassland restoration and  
26 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
27 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
28 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
29 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand  
30 breeding habitat for California horned lark and grasshopper sparrow and reduce the effects of  
31 current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*  
32 *Management*, insect prey populations would be increased on protected lands, enhancing the  
33 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
34 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
35 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
36 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-  
37 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types  
38 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for  
39 California horned lark and grasshopper sparrow. This biological objective provides an estimate for  
40 the high proportion of cultivated lands protected in the near-term time period which would provide  
41 nesting habitat for California horned lark and grasshopper sparrow.

42 The acres of restoration and protection contained in the near-term Plan goals and the additional  
43 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
44 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-  
45 term effects of the other conservation measures with the consideration that some portion of the

1 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable  
2 crop types to compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-130,  
3 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*,  
4 would be available to address the effect of habitat loss in the near-term.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
10 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
11 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

12 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
13 BDCP not to have an adverse effect on individuals, preconstruction surveys for noncovered avian  
14 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
15 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
16 available to address this potential effect.

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

18 Based on the habitat model, the study area supports approximately 269,411 acres of modeled  
19 California horned lark and grasshopper sparrow habitat. Alternative 1A as a whole would result in  
20 the permanent loss of and temporary effects on 29,494 acres of modeled habitat for these species  
21 over the term of the Plan. The locations of these losses are described above in the analyses of  
22 individual conservation measures. The Plan includes conservation commitments through *CM3*  
23 *Natural Communities Protection and Restoration*, *CM8 Grassland Natural Communities Restoration*,  
24 and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and  
25 restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex,  
26 protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands  
27 that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland  
28 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and  
29 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali  
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
32 expand breeding habitat for California horned lark and grasshopper sparrow and reduce the effects  
33 of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*  
34 *Management*, insect prey populations would be increased on protected lands, enhancing the  
35 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
36 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
37 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
38 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in  
39 alfalfa and pasture crop types. These are very high- and high-value crop types for Swainson's hawk  
40 (Objective SH1.2) and would provide potential nesting habitat for California horned lark and  
41 grasshopper sparrow.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. California horned  
4 lark and grasshopper sparrow are not covered species under the BDCP. For the BDCP to avoid an  
5 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
6 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
8 address this potential effect.

9 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential for  
10 mortality of these special-status species under Alternative 1A would represent an adverse effect in  
11 the absence of other conservation actions. With habitat protection and restoration associated with  
12 CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which  
13 would be in place throughout the construction period, and with implementation of Mitigation  
14 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*  
15 *Sparrow Habitat*, the effects of habitat loss under Alternative 1A on California horned lark and  
16 grasshopper sparrow would not be adverse. California horned lark and grasshopper sparrow are  
17 not covered species under the BDCP and the potential for mortality would be an adverse effect  
18 without preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure  
19 BIO-75 would be available to address this effect.

#### 20 **CEQA Conclusion:**

#### 21 **Near-Term Timeframe**

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
24 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
25 effects of construction would be less than significant under CEQA. The Plan would remove 8,167  
26 acres (7,110 permanent, 1,049 temporary) of modeled breeding habitat for California horned lark  
27 and grasshopper sparrow in the study area in the near-term. These effects would result from the  
28 construction of the water conveyance facilities (CM1, 2,333 acres), and implementing other  
29 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
30 *Restoration*, *CMμ7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*  
31 *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural*  
32 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres).

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
34 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be  
35 protected to compensate for the CM1 losses of 2,333 acres of California horned lark and  
36 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
37 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
38 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
39 (2:1 for protection).

40 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
41 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
42 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
43 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
44 in the same timeframe as the construction and early restoration losses thereby avoiding significant

1 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection  
2 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in  
3 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes  
4 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali  
5 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for  
6 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
7 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
8 populations would be increased on protected lands, enhancing the foraging value of these natural  
9 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
10 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
11 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
12 Approximately 87% of cultivated lands protected by the late long-term time period would be in  
13 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
14 SH1.2) which would also provide potential nesting habitat for California horned lark and  
15 grasshopper sparrow. This biological objective provides an estimate for the high proportion of  
16 cultivated lands protected in the near-term time period which would provide nesting habitat for  
17 California horned lark and grasshopper sparrow.

18 The acres of restoration and protection contained in the near-term Plan goals and the additional  
19 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
20 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-  
21 term effects of the other conservation measures with the consideration that some portion of the  
22 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable  
23 crop types to compensate for the loss of habitat at a ratio of 2:1. Implementation of Mitigation  
24 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*  
25 *Sparrow Habitat*, would reduce the impact of habitat loss in the near-term to a less-than-significant  
26 level.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

34 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
35 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
36 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
37 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
38 reduce this potential impact to a less-than-significant level.

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

40 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 29,424  
41 acres of modeled California horned lark and grasshopper sparrow nesting habitat during the term of  
42 the Plan (11% of the total habitat in the study area). The locations of these losses are described  
43 above in the analyses of individual conservation measures. The Plan includes conservation  
44 commitments through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural*  
45 *Communities Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration to*

1 protect 8,000 acres and restore 2,000 acres of grassland natural community, protect 600 acres of  
2 vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres  
3 of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).  
4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
5 and GNC1.2). Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
6 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
7 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
8 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the  
9 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
10 *and Management*, insect prey populations would be increased on protected lands, enhancing the  
11 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
12 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
13 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
14 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in  
15 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
16 SH1.2) which would also provide potential nesting habitat for California horned lark and  
17 grasshopper sparrow. The Plan also includes commitments to implement *AMM1 Worker Awareness*  
18 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*  
19 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*  
20 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
21 *Material, and Dredged Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include  
22 elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent  
23 to work areas. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
24 *Measures*. California horned lark and grasshopper sparrow are not covered species under the BDCP.  
25 For the BDCP to avoid significant impacts on individuals, preconstruction surveys for noncovered  
26 avian species would be required to ensure that nests are detected and avoided. Mitigation Measure  
27 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
28 reduce this potential impact to a less-than-significant level.

29 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
30 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
31 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
32 Measure BIO-75, and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California*  
33 *Horned Lark and Grasshopper Sparrow Habitat*, the loss of habitat and direct mortality through  
34 implementation of Alternative 1A would not result in a substantial adverse effect through habitat  
35 modifications and would not substantially reduce the number or restrict the range of either species.  
36 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-  
37 significant impact on California horned lark and grasshopper sparrow.

38 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
39 **Disturbance of Nesting Birds**

40 See Mitigation Measure BIO-75 under Impact BIO-75.

41 **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**  
42 **Lark and Grasshopper Sparrow Habitat**

43 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
44 crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the

1 total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1  
2 protection. Additional grassland protection, enhancement, and management may be substituted  
3 for the protection of cultivated lands.

4 **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated**  
5 **with Electrical Transmission Facilities**

6 New transmission lines would increase the risk for bird-power line strikes, which could result in  
7 injury or mortality of grasshopper sparrow and California horned lark. *AMM20 Greater Sandhill*  
8 *Crane*, would minimize the risk of bird strikes. Thus, there would be no adverse effect.

9 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
10 could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
11 implementation of *AMM20 Greater Sandhill Crane* the effect of new transmission lines on California  
12 horned lark and grasshopper sparrow would not be adverse.

13 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
14 could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
15 incorporation of *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would have a  
16 less-than-significant impact on grasshopper sparrow and California horned lark.

17 **Impact BIO-132: Indirect Effects of Plan Implementation on Grasshopper Sparrow and**  
18 **California Horned Lark**

19 **Indirect construction-and operation-related effects:** Noise and visual disturbances associated  
20 with construction-related activities could result in temporary disturbances that affect California  
21 horned lark and grasshopper sparrow use of modeled habitat. Construction noise above background  
22 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
23 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
24 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
25 the extent to which these noise levels could affect California horned lark or grasshopper sparrow.  
26 Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
27 grading, filling, contouring, and other ground-disturbing operations. Construction-related noise and  
28 visual disturbances could disrupt nesting and foraging behaviors, and reduce the functions of  
29 suitable habitat which could result in an adverse effect on these species. Mitigation Measure BIO-75,  
30 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
31 available to minimize potential effects on active nests. The use of mechanical equipment during  
32 water conveyance construction could cause the accidental release of petroleum or other  
33 contaminants that could affect these species or their prey in the surrounding habitat. AMM1–AMM7,  
34 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
35 likelihood of such spills from occurring. The inadvertent discharge of sediment or excessive dust  
36 adjacent to grasshopper sparrow and California horned lark and grasshopper sparrow nesting  
37 habitat could also have a negative effect on these species. AMM1–AMM7 would ensure that  
38 measures are in place to prevent runoff from the construction area and the negative effects of dust  
39 on wildlife adjacent to work areas.

40 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of  
41 Alternative 1A implementation could have adverse effects on these species through the modification  
42 of habitat and potential for direct mortality. California horned lark and grasshopper sparrow are not  
43 covered species under the BDCP and the potential for mortality would be an adverse effect without

1 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–  
2 AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
3 *Disturbance of Nesting Birds*, would be available to address this effect.

4 **CEQA Conclusion:** Indirect effects on California horned lark and grasshopper sparrow as a result of  
5 Alternative 1A implementation could have a significant impact on these species. The incorporation  
6 of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds* would reduce this  
8 impact to a less-than-significant level.

9 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
10 **Disturbance of Nesting Birds**

11 See Mitigation Measure BIO-75 under Impact BIO-75.

12 **Impact BIO-133: Periodic Effects of Inundation on California Horned Lark and Grasshopper**  
13 **Sparrow as a Result of Implementation of Conservation Components**

14 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
15 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
16 3,650 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-1A-49).

17 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
18 *Restoration*, could result in the periodic inundation of up to approximately 656 acres of modeled  
19 habitat (Table 12-1A-49).

20 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
21 season due to periodic inundation. However, inundation would occur during the nonbreeding  
22 season and would not be expected to have an adverse effect on either species.

23 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper  
24 sparrow or California horned lark because inundation is expected to occur prior to the breeding  
25 season.

26 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on  
27 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the  
28 breeding season.

29 **Least Bittern and White-Faced Ibis**

30 This section describes the effects of Alternative 1A, including water conveyance facilities  
31 construction and implementation of other conservation components, on least bittern and white-  
32 faced ibis. Modeled breeding habitat for least bittern and white-faced ibis includes tidal freshwater  
33 emergent wetlands, nontidal freshwater emergent wetlands, managed wetlands, and other natural  
34 seasonal wetlands in CZs 2, 4, and 11. Construction and restoration associated with Alternative 1A  
35 conservation measures would result in both temporary and permanent losses of modeled habitat for  
36 mountain plover as indicated in Table 12-1A-50. Full implementation of Alternative 1A would  
37 include the following biological objectives over the term of the BDCP which would also benefit least  
38 bittern and white-faced ibis (BDCP Chapter 3, *Conservation Strategy*).

- 39 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
40 and/or 7 (Objective TFEWNC1.1, associated with CM4).

- Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1, associated with CM10).
- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for these species and implementation of AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least bittern and white-faced ibis would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1A-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	0	0	7	7	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>7</b>	<b>7</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	5,134	13,063	4	4	961–2,672	NA
<b>Total Impacts CM2–CM18</b>		<b>5,134</b>	<b>13,063</b>	<b>4</b>	<b>4</b>	<b>961–2,672</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>5,134</b>	<b>13,063</b>	<b>12</b>	<b>12</b>	<b>961–2,672</b>	<b>NA</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and White-Faced Ibis**

Alternative 1A conservation measures would result in the combined permanent and temporary loss of up to 13,185 acres of modeled habitat for least bittern and white-faced ibis (13,063 acres of permanent loss and 122 of temporary loss, Table 12-1A-50). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), and tidal habitat restoration (CM4). Habitat enhancement and management activities (CM11), which would include ground disturbance and removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate least



1 bittern and white-faced ibis habitat. Each of these individual activities is described below. A  
2 summary statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the  
3 individual conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
5 result in the temporary loss of up to 77 acres of modeled least bittern and white-faced ibis  
6 habitat from CZ 4. The construction footprint for CM1 does not overlap with any occurrences of  
7 least bittern or white-faced ibis. Refer to the Terrestrial Biology Map Book for a detailed view of  
8 Alternative 1A construction locations. Impacts from CM1 would occur within the first 10 years  
9 of Alternative 1A implementation.
- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
11 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the  
12 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is  
13 expected to occur during the first 10 years of Alternative 1A implementation.
- 14 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
15 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and  
16 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 17 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
18 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
19 habitats could result in localized ground disturbances that could temporarily remove small  
20 amounts of least bittern and white-faced ibis habitat. Ground-disturbing activities, such as  
21 removal of nonnative vegetation and road and other infrastructure maintenance activities,  
22 would be expected to have minor adverse effects on available least bittern and white-faced ibis  
23 habitat.
- 24 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
25 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
26 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.  
27 Maintenance activities would include vegetation management, levee and structure repair, and  
28 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
29 AMM1–AMM7 described below and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
30 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce  
31 potential effects.
- 32 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
33 direct mortality of least bittern and white-faced ibis because adults and fledged young would be  
34 expected to avoid contact with construction and other equipment. However, if either species  
35 were to nest in the construction area, equipment operation, noise and visual disturbances could  
36 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.  
37 Mitigation Measure BIO-75 would be available to address these potential effects.

38 The following paragraphs summarize the combined effects discussed above and describe other  
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
40 included.

#### 41 ***Near-Term Timeframe***

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
2 effects of construction would not be adverse under NEPA. The Plan would remove 5,256 acres of  
3 modeled habitat for least bittern and white-faced ibis in the study area in the near-term (5,134 acres  
4 of permanent loss, and 122 acres of temporary loss). These effects would result from the  
5 construction of the water conveyance facilities (CM1, 77 acres), and the implementation of other  
6 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]  
7 5,179 acres).

8 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
9 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
10 these ratios would indicate that 77 acres of habitat should be restored and 77 acres of habitat  
11 should be protected to compensate for the CM1 losses of 77 acres of least bittern and white-faced  
12 ibis habitat. The near-term effects of other conservation actions would remove 5,179 acres of  
13 modeled habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of  
14 least bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for  
15 restoration and 1:1 for protection).

16 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
17 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4  
18 in Chapter 3). These conservation actions are associated with CM4 and CM3 and would occur in the  
19 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
20 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be  
21 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*  
22 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that  
23 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed  
24 wetland would be protected and enhanced in CZ 11 and would benefit these species through the  
25 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
26 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
27 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at  
28 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat  
29 for least bittern and white-faced ibis. These Plan objectives represent performance standards for  
30 considering the effectiveness of restoration and protection actions. The acres of restoration and  
31 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied  
32 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation  
33 measures.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
39 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
40 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
41 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
42 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
43 would be required to ensure that nests are detected and avoided.

1 **Late Long-Term Timeframe**

2 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 13,185  
3 acres (13,063 acres of permanent loss, 122 acres of temporary loss) of least bittern and white-faced  
4 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
5 analyses of individual conservation measures. The Plan includes conservation commitments  
6 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
7 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
8 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
9 of managed wetland would be protected and enhanced in CZ 11.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
15 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
16 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
17 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
18 not to have an adverse effect on individuals, preconstruction surveys for noncovered avian species  
19 would be required to ensure that nests are detected and avoided.

20 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these  
21 special-status species under Alternative 1A would represent an adverse effect in the absence of  
22 other conservation actions. However, with the habitat protection and restoration associated with  
23 CM3, CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7,  
24 which would be in place throughout the construction period, the effects of habitat loss on least  
25 bittern and white-faced ibis would not be adverse under Alternative 1A. Least bittern and white-  
26 faced ibis are not covered species under the BDCP and the potential for mortality would be an  
27 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.  
28 Mitigation Measure BIO-75 would be available to address this effect.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 impacts of construction would be less than significant under CEQA. The Plan would remove 5,256  
35 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-term  
36 (5,134 acres of permanent loss, and 122 acres of temporary loss). These effects would result from  
37 the construction of the water conveyance facilities (CM1, 77 acres), and the implementation of other  
38 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]  
39 5,179 acres).

40 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
41 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
42 these ratios would indicate that 77 acres of habitat should be restored and 77 acres of habitat  
43 should be protected to compensate for the CM1 losses of 77 acres of least bittern and white-faced

1 ibis habitat. The near-term effects of other conservation actions would remove 5,179 acres of  
2 modeled habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of  
3 least bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for  
4 restoration and 1:1 for protection).

5 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent  
6 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3). These  
7 conservation actions are associated with CM4 and CM3 and would occur in the same timeframe as  
8 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
9 least bittern and white-faced ibis. The tidal freshwater emergent wetland would be restored in CZs  
10 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be  
11 restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
12 among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed wetland would be  
13 protected and enhanced in CZ 11 and would benefit these species through the enhancement of  
14 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists  
15 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-  
16 American bulrush plant associations (Objective MWNC1.1). In addition, at least 400 acres of nontidal  
17 marsh would be created, some of which would provide nesting habitat for least bittern and white-  
18 faced ibis. These Plan objectives represent performance standards for considering the effectiveness  
19 of restoration and protection actions. The acres of restoration and protection contained in the near-  
20 term Plan goals satisfy the typical mitigation that would be applied to the project-level effects of  
21 CM1, as well as mitigate the near-term effects of the other conservation measures.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
27 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
28 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
29 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
30 to have a less-than-significant impact on individuals, preconstruction surveys would be required to  
31 ensure that nests were detected and avoided. Mitigation Measure BIO-75 *Conduct Preconstruction*  
32 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce the potential impact on  
33 nesting least bittern and white-faced ibis to a less-than-significant level.

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

35 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 13,185  
36 acres (13,063 acres of permanent loss, 122 acres of temporary loss) of least bittern and white-faced  
37 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
38 analyses of individual conservation measures. The Plan includes conservation commitments  
39 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
40 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
41 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
42 of managed wetland would be protected and enhanced in CZ 11.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that avoid or*  
4 *minimize the risk of affecting individuals and species habitats adjacent to work areas and storage*  
5 *sites. The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization*  
6 *Measures. Least bittern and white-faced ibis are not covered species under the BDCP. To avoid a*  
7 *significant impact on individuals, preconstruction surveys for noncovered avian species would be*  
8 *required to ensure that nests were detected and avoided. Mitigation Measure BIO-75 would reduce*  
9 *the potential impact on nesting least bittern and white-faced ibis and to a less-than-significant level.*

10 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
11 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
12 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
13 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
14 *Nesting Birds*, the loss of habitat or direct mortality through implementation of Alternative 1A would  
15 not result in a substantial adverse effect through habitat modifications and would not substantially  
16 reduce the number or restrict the range of the species. Therefore, the loss of habitat and potential  
17 mortality under this alternative would have a less-than-significant impact on least bittern and  
18 white-faced ibis.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
20 **Disturbance of Nesting Birds**

21 See Mitigation Measure BIO-75 under Impact BIO-75.

22 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical**  
23 **Transmission Facilities**

24 New transmission lines would increase the risk for bird-power line strikes, which could result in  
25 injury or mortality of least bittern and white-faced ibis. The risk for bird-power line strikes would be  
26 minimized with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This measure  
27 would ensure that conductor and ground lines are fitted with flight diverters in compliance with the  
28 best available practices, such as those specified in the USFWS Avian Protection Guidelines.

29 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
30 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
31 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would not have an adverse  
32 effect on least bittern and white-faced ibis.

33 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
34 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
35 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would have a less-than-  
36 significant impact on least bittern and white-faced ibis.

37 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced**  
38 **Ibis**

39 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
40 with construction-related activities could result in temporary disturbances that affect least bittern  
41 and white-faced ibis use of modeled habitat. Construction noise above background noise levels

1 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
2 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
3 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
4 which these noise levels could affect least bittern or white-faced ibis. Indirect effects associated with  
5 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and  
6 other ground-disturbing operations. Construction-related noise and visual disturbances could  
7 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
8 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
9 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize  
10 potential effects on active nests. The use of mechanical equipment during water conveyance  
11 facilities construction could cause the accidental release of petroleum or other contaminants that  
12 could affect these species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2*  
13 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such  
14 spills from occurring. The inadvertent discharge of sediment or excessive dust adjacent to least  
15 bittern and white-faced ibis could also have a negative effect on these species. AMMs 1–7 would  
16 ensure that measures are in place to prevent runoff from the construction area and the negative  
17 effects of dust on wildlife adjacent to work areas.

18 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
19 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
20 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
21 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
22 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
23 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
24 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
25 associated with natural community and floodplain restoration could indirectly affect least bittern  
26 and white-faced ibis, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D,  
27 *Contaminants*).

28 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
29 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
30 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
31 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
32 adaptive management as described in CM12 would be available to address the uncertainty of  
33 methylmercury levels in restored tidal marsh and potential impacts on least bittern and white-faced  
34 ibis.

35 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
36 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
37 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
38 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
39 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
40 classes within a species. In addition, the effect of selenium on a species can be confounded by  
41 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
42 2009).

43 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
44 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
45 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At

1 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
2 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
3 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
4 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
5 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
6 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
7 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
8 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
9 levels of selenium have a higher risk of selenium toxicity.

10 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
11 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
12 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced  
13 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,  
14 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.  
15 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
16 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
17 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
18 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
19 long-term increases in selenium concentrations in water in the Delta under any alternative.  
20 However, it is difficult to determine whether the effects of potential increases in selenium  
21 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to  
22 adverse effects on least bittern and white-faced ibis.

23 Because of the uncertainty that exists at this programmatic level of review, there could be a  
24 substantial effect on least bittern and white-faced ibis from increases in selenium associated with  
25 restoration activities. This effect would be addressed through the implementation of *AMM27*  
26 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
27 provide specific tidal habitat restoration design elements to reduce the potential for  
28 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
29 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
30 evaluated separately for each restoration effort as part of design and implementation. This  
31 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
32 design schedule.

33 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
34 water conveyance facilities could have adverse effects on these species in the absence of other  
35 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this  
36 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
37 *Disturbance of Nesting Birds*, would also be available to address the potential indirect effects of  
38 construction on active nests. Tidal habitat restoration could result in increased exposure of least  
39 bittern and white-faced ibis to selenium. This effect would be addressed through the  
40 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
41 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
42 bioavailability in tidal habitats.

43 Increased methylmercury associated with natural community and floodplain restoration could  
44 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in  
45 the BDCP, Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of

1 methylmercury are harmful to the species, and the potential for increased exposure varies  
2 substantially within the study area. *CM12 Methylmercury Management* contains provisions for  
3 project-specific Mercury Management Plans. Site-specific restoration plans that address the creation  
4 and mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
5 would better inform potential effects and address the uncertainty of methylmercury levels in  
6 restored tidal marsh in the study area. The site-specific planning phase of marsh restoration would  
7 be the appropriate place to assess the potential for risk of methylmercury exposure for least bittern  
8 and white-faced ibis, once site specific sampling and other information could be developed.

9 **CEQA Conclusion:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
10 water conveyance facilities could have a significant impact on these species. The incorporation of  
11 *AMM1–AMM7* into the BDCP and the implementation of Mitigation Measure *BIO-75, Conduct*  
12 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
13 impact to a less-than-significant level. Increased methylmercury associated with natural community  
14 and floodplain restoration could indirectly affect least bittern and white-faced ibis, via uptake in  
15 lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*). In addition, the  
16 potential mobilization or creation of methylmercury within the Plan Area varies with site-specific  
17 conditions and would need to be assessed at the project level. *CM12 Methylmercury Management*  
18 contains provisions for project-specific Mercury Management Plans. Tidal habitat restoration could  
19 result in increased exposure of least bittern and white-faced ibis to selenium. This effect would be  
20 addressed through the implementation of *AMM27 Selenium Management* which would provide  
21 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
22 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1A  
23 implementation would not have a significant impact on least bittern and white-faced ibis.

24 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
25 **Disturbance of Nesting Birds**

26 See Mitigation Measure BIO-75 under Impact BIO-75.

27 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**  
28 **Result of Implementation of Conservation Components**

29 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
30 *Enhancement*) would increase the frequency and duration of inundation on approximately 961–  
31 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-1A-50). However, no  
32 adverse effects of increased inundation frequency on nesting habitat are expected because wetland  
33 vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to frequency  
34 and inundation are within the tolerance of these vegetation types. Inundation would occur in the  
35 nonbreeding season and wetlands supporting habitat would not be expected to be affected by flood  
36 flows.

37 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on  
38 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo  
39 Bypass flooding regime, and changes to frequency and duration of inundation would be within the  
40 tolerance of these vegetation types.

41 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant  
42 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the



1 existing Yolo Bypass flooding regime, and changes to frequency and duration of inundation would be  
2 within the tolerance of these vegetation types.

### 3 **Loggerhead Shrike**

4 This section describes the effects of Alternative 1A, including water conveyance facilities  
5 construction and implementation of other conservation components, on loggerhead shrike. Modeled  
6 habitat for loggerhead shrike includes both high-value and low-value modeled habitat. High-value  
7 habitat includes grassland, vernal pool complex and alkali seasonal wetland natural communities in  
8 addition to cultivated lands, including pasture and grain and hay crops. Low-value habitat includes  
9 row crops such as truck and berry crops and field crops which are not considered to be valuable  
10 habitat for the species but were included in the model as they may provide foraging opportunities.

11 Construction and restoration associated with Alternative 1A conservation measures would result in  
12 both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in  
13 Table 12-1A-51. Full implementation of Alternative 1A would include the following biological  
14 objectives over the term of the BDCP which would also benefit loggerhead shrike (BDCP Chapter 3,  
15 *Conservation Strategy*).

- 16 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
17 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
18 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 19 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 20 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
21 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 22 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
23 VPNC2.5, and GNC2.4, associated with CM11).
- 24 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
25 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 26 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
27 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
28 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
29 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
30 with CM3 and CM11).
- 31 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
32 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated  
33 with CM11).

34 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
35 management activities that would enhance habitat for the species and implementation of AMM1-  
36 AMM7 and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for  
37 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 1A**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	1,660	1,660	673	673	NA	NA
	Low-value	1,573	1,573	616	616	NA	NA
<b>Total Impacts CM1</b>		<b>3,233</b>	<b>3,233</b>	<b>1,289</b>	<b>1,289</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	High-value	5,450	26,198	376	893	777-2,423	3,823
	Low-value	1,801	17,575	97	624	672-1,996	4,315
<b>Total Impacts CM2-CM18</b>		<b>7,251</b>	<b>43,723</b>	<b>474</b>	<b>1,517</b>	<b>1,830-5,646</b>	<b>8,138</b>
<b>Total High-value</b>		<b>7,110</b>	<b>27,858</b>	<b>1,049</b>	<b>1,566</b>	<b>777-2,423</b>	<b>3,823</b>
<b>Total Low-value</b>		<b>3,374</b>	<b>19,148</b>	<b>713</b>	<b>1,240</b>	<b>672-1,996</b>	<b>4,315</b>
<b>TOTAL IMPACTS</b>		<b>10,484</b>	<b>47,006</b>	<b>1,762</b>	<b>2,806</b>	<b>1,830-5,646</b>	<b>8,138</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**  
5 **Loggerhead Shrike**

6 Alternative 1A conservation measures would result in the combined permanent loss or conversion  
7 and temporary loss of up to 49,812 acres of modeled habitat for loggerhead shrike (29,424 acres of  
8 which would be high-value habitat, Table 12-1A-51). Conservation measures that would result in  
9 these losses are conveyance facilities and transmission line construction, and establishment and use  
10 of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat  
11 restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), riparian  
12 restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),  
13 nontidal marsh restoration (CM10), natural communities enhancement and management (CM11)  
14 and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244 acres)  
15 would result from CM4. Habitat enhancement and management activities (CM11), which include  
16 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,  
17 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities  
18 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
19 facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these individual  
20 activities is described below. A summary statement of the combined impacts and NEPA effects, and a  
21 CEQA conclusion follow the individual conservation measure discussions.

- 1       • *CM1 Water Facilities and Operation: CM1 Water Facilities and Operation:* Construction of  
2 Alternative 1A conveyance facilities would result in the combined permanent and temporary  
3 loss of up to 2,333 acres of high-value loggerhead shrike habitat (1,660 acres of permanent loss,  
4 673 acres of temporary loss). In addition, 2,189 acres of low-value habitat would be removed  
5 (1,573 acres of permanent loss or conversion, 616 acres of temporary loss or conversion). The  
6 largest impact from CM1 on loggerhead shrike habitat would occur in CZ 8, where there are  
7 larger stands of ruderal and herbaceous vegetation and California annual grassland, which  
8 provides high-value habitat for the species. Approximately 685 acres of impact would be from  
9 the new forebay constructed south of Clifton Court Forebay and from the potential borrow and  
10 spoils site southwest of the proposed forebay. Loggerhead shrikes nest in high abundance in  
11 these grasslands to the south and to the west of Clifton Court Forebay. Shrikes were detected  
12 using this area at a much higher rate than other grasslands and areas in the Delta during DHCCP  
13 surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*  
14 *Report*). There are 4 loggerhead shrike occurrences that intersect with the construction  
15 footprint for the new forebay. In addition, one occurrence intersects with the footprint for a  
16 permanent transmission line south of the forebay. Mitigation Measure BIO-75, *Conduct*  
17 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require  
18 preconstruction surveys and the establishment of no-disturbance buffers and would be  
19 available to address potential effects on nesting loggerhead shrikes. Refer to the Terrestrial  
20 Biology Map Book for a detailed view of Alternative 1A construction locations. Construction of  
21 the water conveyance facilities would occur in the near-term timeframe.
- 22       • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries enhancement  
23 would result in the combined permanent and temporary loss of up to 1,274 acres of high-value  
24 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo  
25 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of  
26 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10  
27 years of Alternative 1A implementation.
- 28       • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
29 inundation would permanently remove an estimated 20,880 acres of high-value loggerhead  
30 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would  
31 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the  
32 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of  
33 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal  
34 restoration would directly impact and fragment grassland just north of Rio Vista in and around  
35 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses  
36 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo  
37 Bypass and on the northern fringes of Suisun Marsh.
- 38       • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore  
39 seasonally inundated floodplain would permanently and temporarily remove approximately  
40 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These  
41 losses would be expected after the first 10 years of Alternative 1A implementation along the San  
42 Joaquin River and other major waterways in CZ 7.
- 43       • *CM7 Riparian Natural Community Restoration:* Riparian restoration would permanently remove  
44 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and  
45 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat

1 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of  
2 seasonal floodplain restoration through CM7.

3 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
4 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
5 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
6 would be restored after the construction periods. Grassland restoration would be implemented  
7 on agricultural lands that also provide habitat for loggerhead shrike and would result in the  
8 conversion of 1,849 acres of cultivated lands to high-value grassland.

9 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
10 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value  
11 loggerhead shrike habitat.

12 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
13 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
14 habitats could result in localized ground disturbances that could temporarily remove small  
15 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
16 vegetation and road and other infrastructure maintenance activities, would be expected to have  
17 minor adverse effects on available habitat and would be expected to result in overall  
18 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
19 also include the construction of recreational-related facilities including trails, interpretive signs,  
20 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
21 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
22 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
23 of grassland habitat would be lost from the construction of trails and facilities.

24 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.  
25 If either species were to nest in the vicinity of a worksite, equipment operation could destroy  
26 nests, and noise and visual disturbances could lead to their abandonment, resulting in mortality  
27 of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*  
28 *and Avoid Disturbance of Nesting Birds*, would be available to address these potential effects.

29 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
30 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation  
31 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan  
32 implementation.

33 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
34 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
35 disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance  
36 activities would include vegetation management, levee and structure repair, and re-grading of  
37 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,  
38 Mitigation Measure BIO-75, and conservation actions as described below.

39 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
40 direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,  
41 because they would be expected to avoid contact with construction and other equipment. If  
42 either species were to nest in the construction area, construction-related activities, including  
43 equipment operation, noise and visual disturbances could destroy nests or lead to their

1 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
2 available to address these potential effects.

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

### 6 ***Near-Term Timeframe***

7 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
8 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
9 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
10 effects of construction would not be adverse under NEPA. The Plan would remove 8,159 acres  
11 (7,110 permanent, 1,049 temporary) of high-value habitat for loggerhead shrike in the study area in  
12 the near-term. These effects would result from the construction of the water conveyance facilities  
13 (CM1, 2,333 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
14 *Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
15 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
16 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
17 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres). In  
18 addition, 4,087 acres of low-value habitat would be removed or converted in the near-term (CM1,  
19 2,189 acres; *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration,*  
20 *CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9*  
21 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities*  
22 *Enhancement and Management* and *CM18 Conservation Hatcheries*—1,898 acres).

23 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
24 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 4,666 acres  
25 should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
26 effects of other conservation actions would require 11,652 acres of protection to compensate for the  
27 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
28 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a  
29 large proportion of the low-value habitat would result from the conversion and enhancement to  
30 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
31 quickly after completion of construction.

32 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
33 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
34 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
35 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
36 in the same timeframe as the construction and early restoration losses.

37 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
38 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
39 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
40 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
41 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce  
42 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
43 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
44 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and

1 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
2 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
3 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
4 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
5 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
6 along field borders and roadsides within protected cultivated lands would also provide high-value  
7 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
8 performance standards for considering the effectiveness of conservation actions.

9 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
10 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
11 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
12 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration  
13 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe  
14 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the  
15 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such  
16 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. Mitigation  
17 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*,  
18 would be available to address the effect of near-term, high-value habitat loss. The management and  
19 enhancement of cultivated lands including insect prey enhancement through CM3 and CM11, the  
20 protection of shrubs and establishment of hedgerows within protected cultivated lands would  
21 compensate for any potential effect from the loss of low-value loggerhead shrike foraging habitat.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
27 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
28 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

29 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse  
30 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
31 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
32 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

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

34 Alternative 1A as a whole would result in the combined permanent of and temporary effects on  
35 29,424 acres of high-value habitat and 20,388 acres of low-value loggerhead shrike habitat over the  
36 term of the Plan. The locations of these losses are described above in the analyses of individual  
37 conservation measures. The Plan includes conservation commitments through *CM3 Natural*  
38 *Communities Protection and Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9*  
39 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore  
40 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150  
41 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide  
42 suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and  
43 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
44 protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland

1 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
2 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,  
3 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current  
4 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,  
5 insect prey populations would be increased on protected lands, enhancing the foraging value of  
6 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that  
7 provide habitat for covered and other native wildlife species would provide approximately 48,625  
8 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is  
9 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and  
10 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the  
11 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides  
12 within protected cultivated lands would also provide high-value nesting habitat for loggerhead  
13 shrike (Objective SH2.2).

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
19 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
20 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
21 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
22 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
23 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
24 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this potential effect.

25 **NEPA Effects:** The loss of loggerhead shrike habitat and potential for mortality of this special-status  
26 species under Alternative 1A would represent an adverse effect in the absence of other conservation  
27 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided  
28 by biological goals and objectives and by AMM1–AMM7, and with implementation of Mitigation  
29 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*,  
30 which would be available to guide the near-term protection and management of cultivated lands, the  
31 effects of habitat loss on loggerhead shrike under Alternative 1A would not be adverse. Loggerhead  
32 shrike is not a covered species under the BDCP and the potential for mortality would be an adverse  
33 effect without preconstruction surveys to ensure that nests are detected and avoided. Mitigation  
34 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
35 *Birds*, would be available to address this potential effect.

### 36 **CEQA Conclusion:**

#### 37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
41 effects of construction would be less than significant under CEQA. The Plan would remove 8,159  
42 acres (7,110 permanent, 1,049 temporary) of high-value habitat for loggerhead shrike in the study  
43 area in the near-term. These effects would result from the construction of the water conveyance  
44 facilities (CM1, 2,333 acres), and implementing other conservation measures (*CM2 Yolo Bypass*

1 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated*  
2 *Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural*  
3 *Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11*  
4 *Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826*  
5 *acres). In addition, 4,087 acres of low-value habitat would be removed or converted in the near-*  
6 *term (CM1, 2,189 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
7 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
8 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
9 *Communities Enhancement and Management and CM18 Conservation Hatcheries—1,898 acres).*

10 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
11 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 4,666 acres  
12 should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
13 effects of other conservation actions would require 11,652 acres of protection to compensate for the  
14 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
15 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a  
16 large proportion of the low-value habitat would result from the conversion and enhancement to  
17 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
18 quickly after completion of construction.

19 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
20 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
21 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
22 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
23 in the same timeframe as the construction and early restoration losses.

24 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
25 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
26 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
27 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
28 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce  
29 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
30 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
31 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
32 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
33 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
34 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
35 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
36 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
37 along field borders and roadsides within protected cultivated lands would also provide high-value  
38 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
39 performance standards for considering the effectiveness of conservation actions.

40 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
41 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
42 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
43 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration  
44 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe  
45 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the



1 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such  
2 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. The  
3 implementation of Mitigation Measure BIO-138, *Compensate for the Near-term Loss of High-Value*  
4 *Loggerhead Shrike Habitat*, would reduce the impact of near-term, high-value habitat loss to a less-  
5 than-significant level. The management and enhancement of cultivated lands including insect prey  
6 enhancement through CM3 and CM11, the protection of shrubs and establishment of hedgerows  
7 within protected cultivated lands would compensate for any potential impact from the loss of low-  
8 value loggerhead shrike foraging habitat.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
13 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
14 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
15 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

16 The loggerhead shrike is not a covered species under the BDCP and in order to avoid an adverse  
17 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
18 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
19 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a  
20 less-than-significant level.

### 21 **Late Long-Term Timeframe**

22 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 29,692  
23 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 21,047 acres  
24 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are  
25 described above in the analyses of individual conservation measures. The Plan includes  
26 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM8*  
27 *Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland*  
28 *Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community,  
29 protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and  
30 protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species  
31 (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and  
32 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, CZ 8, and CZ 11 would be  
33 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
34 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
35 pool natural communities which would create larger, more expansive patches of high-value habitat  
36 for loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
37 *Natural Communities Enhancement and Management*, insect prey populations would be increased on  
38 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
39 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife  
40 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead  
41 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to  
42 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain  
43 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide  
44 hedgerows along field borders and roadsides within protected cultivated lands would also provide  
45 high-value nesting habitat for loggerhead shrike (Objective SH2.2).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
6 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
7 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
8 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
9 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
10 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
11 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-  
12 significant level.

13 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
14 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
15 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
16 Measure BIO-75, and Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*  
17 *Loggerhead Shrike Habitat*, the loss of habitat and direct mortality through implementation of  
18 Alternative 1A would not result in a substantial adverse effect through habitat modifications and  
19 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of  
20 habitat and potential mortality under this alternative would have a less-than-significant impact on  
21 loggerhead shrike.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value**  
26 **Loggerhead Shrike Habitat**

27 Because the BDCP does not include acreage commitments for the protection of crop types in the  
28 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as  
29 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the  
30 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
31 2:1. Additional grassland protection, enhancement, and management may be substituted for the  
32 protection of high-value cultivated lands.

33 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**  
34 **Facilities**

35 New transmission lines would increase the risk for bird-power line strikes, which could result in  
36 injury or mortality of loggerhead shrike. The risk for bird-power line strikes would be minimized  
37 with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This measure would ensure  
38 that conductor and ground lines are fitted with flight diverters in compliance with the best available  
39 practices, such as those specified in the USFWS Avian Protection Guidelines and would further  
40 ensure no adverse effect from electrical transmission facilities.

1 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
2 could result in injury or mortality of loggerhead shrike. With the implementation of *AMM20 Greater*  
3 *Sandhill Crane* the effect of new transmission lines on loggerhead shrike would not be adverse.

4 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
5 could result in injury or mortality of loggerhead shrike. With the incorporation of *AMM20 Greater*  
6 *Sandhill Crane* into the BDCP, new transmission lines would have a less-than-significant impact on  
7 loggerhead shrike.

## 8 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

9 Noise and visual disturbances associated with construction-related activities could result in  
10 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise  
11 above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge  
12 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
13 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to  
14 determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects  
15 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
16 contouring, and other ground-disturbing operations. Construction-related noise and visual  
17 disturbances could disrupt nesting and foraging behaviors, and reduce the functions of suitable  
18 habitat which could result in an adverse effect on these species. Indirect effects from construction of  
19 the new forebay in CZ 8 could result in substantial effects on active loggerhead shrike nests. DHCCP  
20 surveys in 2009 detected 10 nest sites south-west of the Clifton Court Forebay (Appendix 12C, *2009*  
21 *to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*) and the large expanses of  
22 grassland in CZ 8 provide high-value nesting habitat for the species. Mitigation Measure BIO-75,  
23 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
24 available to minimize potential effects on active nests. The use of mechanical equipment during  
25 water conveyance facilities construction could cause the accidental release of petroleum or other  
26 contaminants that could affect these species or their prey in the surrounding habitat. AMM1–AMM7,  
27 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
28 likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to  
29 loggerhead shrike nesting habitat could also have a negative effect on these species. AMM1–AMM7  
30 would ensure that measures are in place to prevent runoff from the construction area and the  
31 negative effects of dust on wildlife adjacent to work areas.

32 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Plan implementation could have  
33 adverse effects on these species through the modification of habitat and potential for direct  
34 mortality. The loggerhead shrike is not a covered species under the BDCP and the potential for  
35 mortality would be adverse without preconstruction surveys to ensure that nests are detected and  
36 avoided. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting  
37 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to  
38 work areas. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction*  
39 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
40 potential effect.

41 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 1A implementation  
42 could have a significant impact on these species. Construction of the new forebay in CZ 8 would have  
43 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton  
44 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and

1 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
2 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

3 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
4 **Disturbance of Nesting Birds**

5 See Mitigation Measure BIO-75 under Impact BIO-75.

6 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**  
7 **Implementation of Conservation Components**

8 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
9 *Enhancement*) would increase the frequency and duration of inundation on 1,830–5,646 acres of  
10 modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of high-value  
11 habitat; Table 12-1A-51).

12 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
13 *Restoration*, could result in the periodic inundation of up to approximately 8,138 acres of modeled  
14 habitat (Table 12-1A-51), consisting of 3,823 acres of high-value and 4,315 acres of low-value  
15 habitat.

16 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
17 season due to periodic inundation. However, increased frequency and duration of inundation would  
18 occur during the nonbreeding season.

19 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead  
20 shrike from the modification of habitat. Reduced foraging habitat availability may be expected  
21 during the fledgling period of the nesting season due to periodic inundation. However, increased  
22 frequency and duration of inundation would occur during the nonbreeding season.

23 **CEQA Conclusion:** Periodic inundation of floodplains would have a less-than-significant impact on  
24 loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be  
25 expected during the fledgling period of the nesting season due to periodic inundation. However,  
26 increased frequency and duration of inundation would occur during the nonbreeding season.

27 **Song Sparrow “Modesto” Population**

28 This section describes the effects of Alternative 1A, including water conveyance facilities  
29 construction and implementation of other conservation components, on Modesto song sparrow. The  
30 Modesto song sparrow is common and ubiquitous throughout the study area, excluding CZ 11, and  
31 modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal  
32 freshwater emergent, and valley/foothill riparian vegetation communities.

33 Construction and restoration associated with Alternative 1A conservation measures would result in  
34 both temporary and permanent removal of Modesto song sparrow habitat in the quantities  
35 indicated in Table 12-1A-52. However, BDCP activities are expected to have little impact on the  
36 population. Full implementation of Alternative 1A would include the following biological objectives  
37 over the term of the BDCP which would also benefit Modesto song sparrow (BDCP Chapter 3,  
38 *Conservation Strategy*).

- 1       • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
2       3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
3       associated with CM7).
- 4       • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
5       10 (Objective VFRNC1.2, associated with CM3).
- 6       • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,  
7       and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 8       • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
9       and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
10       associated with CM10)
- 11       • Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,  
12       associated with CM10).
- 13       • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
14       VPNC2.5, and GNC2.4, associated with CM11).
- 15       • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
16       lands that occur in cultivated lands within the reserve system, including isolated valley oak  
17       trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
18       water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
19       with CM3).
- 20       • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
21       cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated  
22       with CM3).

23       As explained below, with the restoration or protection of these amounts of habitat, in addition to  
24       implementation of AMMs and Mitigation Measure BIO-75, impacts on Modesto song sparrow would  
25       not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative**  
2 **1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	70	70	116	116	NA	NA
<b>Total Impacts CM1</b>		<b>70</b>	<b>70</b>	<b>116</b>	<b>116</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	2,444	3,253	133	169	81-158	284
<b>Total Impacts CM2-CM18</b>		<b>2,444</b>	<b>3,253</b>	<b>133</b>	<b>169</b>	<b>81-158</b>	<b>284</b>
<b>TOTAL IMPACTS</b>		<b>2,514</b>	<b>3,323</b>	<b>249</b>	<b>285</b>	<b>81-158</b>	<b>284</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**  
5 **Sparrow**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 3,608 acres of modeled habitat for Modesto song sparrow (3,323 acres of permanent loss  
8 and 285 acres of temporary loss of habitat, Table 12-1A-52). Conservation measures that would  
9 result in these losses are conveyance facilities and transmission line construction, and establishment  
10 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
11 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
12 activities (CM11), which would include ground disturbance and removal of nonnative vegetation,  
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
15 degrade or eliminate Modesto song sparrow modeled habitat. Each of these individual activities is  
16 described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
17 conclusion follows the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
19 result in the combined permanent and temporary loss of up to 186 acres of modeled Modesto  
20 song sparrow habitat (70 acres of permanent loss, 116 acres of temporary loss) from CZs 3-6 and  
21 CZ 8. The CM1 construction footprint overlaps with nine Modesto song sparrow occurrences  
22 and the species is ubiquitous throughout the Delta. The footprint for the new forebay overlaps  
23 with three occurrences, and a temporary intake work area and temporary pipeline work area  
24 overlap with 6 occurrences. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
25 *Surveys and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the

1 establishment of no-disturbance buffers and would be available to address potential effects on  
2 nesting Modesto song sparrows. Refer to the Terrestrial Biology Map Book for a detailed view of  
3 Alternative 1A construction locations. Construction of the water conveyance facilities would  
4 occur within the first 10 years of Alternative 1A implementation.

- 5 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
6 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo  
7 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses  
8 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural  
9 community and managed wetland. The loss is expected to occur during the first 10 years of  
10 Alternative 1A implementation.
  - 11 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
12 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled  
13 Modesto song sparrow habitat by the late long-term.
  - 14 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
15 seasonally inundated floodplain would permanently and temporarily remove approximately 80  
16 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses  
17 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The  
18 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural  
19 community. These lands would be managed as a mosaic of seral stages, age classes, and plant  
20 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
  - 21 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
22 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
23 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
24 activity would occur along waterway margins where riparian habitat stringers exist, including  
25 levees and channel banks. The improvements would occur within the study area on sections of  
26 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.  
27 Some of the restored riparian habitat in the channel margin would be expected to support  
28 nesting habitat for Modesto song sparrow.
  - 29 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
30 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
31 habitats could result in localized ground disturbances that could temporarily remove small  
32 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
33 vegetation and road and other infrastructure maintenance activities, would be expected to have  
34 minor adverse effects on available habitat and would be expected to result in overall  
35 improvements to and maintenance of habitat values over the term of the BDCP.
- 36 Habitat management- and enhancement-related activities could affect Modesto song sparrow  
37 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could  
38 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in  
39 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
40 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these  
41 potential effects.
- 42 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
43 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
44 disturbances that could affect Modesto song sparrow use of the surrounding habitat.

1 Maintenance activities would include vegetation management, levee and structure repair, and  
2 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
3 AMMs, and conservation actions as described below.

- 4 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
5 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,  
6 because they would be expected to avoid contact with construction and other equipment. If  
7 either species were to nest in the construction area, construction-related activities, including  
8 equipment operation, noise and visual disturbances could destroy nests or lead to their  
9 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
10 available to address these potential effects.

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

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

15 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
16 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
17 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
18 effects of construction would not be adverse under NEPA. The Plan would remove 2,763 acres of  
19 modeled habitat (2,514 permanent, 249 temporary) for Modesto song sparrow in the study area in  
20 the near-term. These effects would result from the construction of the water conveyance facilities  
21 (CM1, 186 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
22 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
23 *Restoration—2,577 acres*).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
25 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
26 would indicate that 186 acres of suitable habitat should be restored/created and 186 acres should  
27 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term  
28 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore  
29 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow  
30 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for  
31 protection).

32 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
33 valley/foothill riparian natural community, restoring 8,850 acres of tidal freshwater emergent  
34 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
35 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are  
36 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the  
37 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
38 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of  
39 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
40 community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*) and would  
41 provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent wetland  
42 would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be restored in a  
43 way that creates topographic heterogeneity and in areas that increase connectivity among protected  
44 lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in CZs 2, 4, and/or 5, and



1 the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the nontidal marsh and  
2 managed wetland restoration are associated with CM10 and would provide nesting habitat for  
3 Modesto song sparrow.

4 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
5 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
6 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
7 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
8 The management of protected grasslands to increase insect prey through techniques such as the  
9 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
10 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
11 standards for considering the effectiveness of conservation actions. The acres of restoration and  
12 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
13 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
14 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material* and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

22 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse  
23 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
24 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
25 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
26 potential effect.

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

28 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 3,608  
29 acres (3,323 acres of permanent loss, 285 acres of temporary loss) of modeled Modesto song  
30 sparrow habitat during the term of the Plan. The locations of these losses are described above in the  
31 analyses of individual conservation measures. The Plan includes conservation commitments  
32 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*  
33 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of  
34 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent  
35 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the  
36 Plan Area (Table 3-4 in Chapter 3). Additional acres of valley/foothill riparian habitat would be  
37 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and  
38 slough channels in the Delta, some of which would be expected to support nesting habitat for  
39 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of  
40 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,  
41 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives  
42 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the  
43 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would  
44 provide suitable nesting habitat for Modesto song sparrow.

1 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
2 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
3 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
4 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
5 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
6 CM10 and would provide nesting habitat for Modesto song sparrow.

7 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
8 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
9 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
10 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
11 management of protected grasslands to increase insect prey through techniques such as the  
12 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
13 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
14 standards for considering the effectiveness of conservation actions. The acres of restoration and  
15 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
16 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
17 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
25 sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
26 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
27 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
28 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this potential effect.

29 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential for mortality of this special-  
30 status species under Alternative 1A would represent an adverse effect in the absence of other  
31 conservation actions. With habitat protection and restoration associated with CM3, CM4, CM6, CM7,  
32 and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place  
33 throughout the construction period, the effects of habitat loss on Modesto song sparrow under  
34 Alternative 1A would not be adverse. The Modesto song sparrow is not a covered species under the  
35 BDCP and the potential for mortality would be an adverse effect without preconstruction surveys to  
36 ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be available to  
37 address this effect.

### 38 **CEQA Conclusion:**

#### 39 **Near-Term Timeframe**

40 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
41 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
42 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
43 effects of construction would be less than significant under CEQA. The Plan would remove 2,763  
44 acres of modeled habitat (2,514 permanent, 249 temporary) for Modesto song sparrow in the study

1 area in the near-term. These effects would result from the construction of the water conveyance  
2 facilities (CM1, 186 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
3 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*  
4 *Floodplain Restoration*—2,577 acres).

5 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
6 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
7 would indicate that 186 acres of suitable habitat should be restored/created and 186 acres should  
8 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term  
9 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore  
10 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow  
11 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for  
12 protection).

13 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
14 valley/foothill riparian natural community, restoring 8,850 acres of tidal freshwater emergent  
15 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
16 Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with CM3, CM4, CM7,  
17 and CM10 and would occur in the same timeframe as the construction and early restoration losses,  
18 thereby avoiding a significant impact of habitat loss on Modesto song sparrow. The majority of the  
19 riparian restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands  
20 or large patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2  
21 in BDCP Chapter 3, *Conservation Strategy*) and would provide suitable Modesto song sparrow  
22 nesting habitat. The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or  
23 7 (Objective TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity  
24 and in areas that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal  
25 marsh restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would  
26 occur in CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated  
27 with CM10 and would provide nesting habitat for Modesto song sparrow.

28 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
29 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
30 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
31 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
32 The management of protected grasslands to increase insect prey through techniques such as the  
33 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
34 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
35 standards for considering the effectiveness of conservation actions. The acres of restoration and  
36 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
37 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
38 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
44 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
45 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song

1 sparrow is not a covered species under the BDCP. For the BDCP to have a less-than-significant  
2 impact on individuals, preconstruction surveys for noncovered avian species would be required to  
3 ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,  
4 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce  
5 this impact to a less-than-significant level.

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

7 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 3,608  
8 acres (3,323 acres of permanent loss, 285 acres of temporary loss) of modeled Modesto song  
9 sparrow habitat during the term of the Plan. The locations of these losses are described above in the  
10 analyses of individual conservation measures. The Plan includes conservation commitments  
11 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*  
12 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of  
13 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent  
14 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the  
15 Plan Area (Table 3-4 in Chapter 3). Additional acres of valley/foothill riparian habitat would be  
16 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and  
17 slough channels in the Delta, some of which would be expected to support nesting habitat for  
18 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of  
19 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,  
20 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives  
21 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the  
22 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would  
23 provide suitable nesting habitat for Modesto song sparrow.

24 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
25 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
26 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
27 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
28 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
29 CM10 and would provide nesting habitat for Modesto song sparrow.

30 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
31 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
32 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
33 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
34 management of protected grasslands to increase insect prey through techniques such as the  
35 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
36 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
37 standards for considering the effectiveness of conservation actions. The acres of restoration and  
38 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
39 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
40 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *Reusable Tunnel Material*, and *Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
4 sparrow is not a covered species under the BDCP. For the BDCP to minimize direct mortality of  
5 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
6 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
7 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant  
8 level.

9 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
10 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
11 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
12 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of  
13 Alternative 1A would not result in a substantial adverse effect through habitat modifications and  
14 would not substantially reduce the number or restrict the range of either species. Therefore, the loss  
15 of habitat or potential mortality under this alternative would have a less-than-significant impact on  
16 Modesto song sparrow.

17 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
18 **Disturbance of Nesting Birds**

19 See Mitigation Measure BIO-75 under Impact BIO-75.

20 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**  
21 **Facilities**

22 New transmission lines would increase the risk for bird-power line strikes, which could result in  
23 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song  
24 sparrow and the incremental increased risk from the construction of new transmission lines is not  
25 expected to adversely affect the population.

26 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new  
27 transmission lines would not adversely affect the Modesto song sparrow population.

28 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of  
29 new transmission lines would have a less-than-significant impact on the Modesto song sparrow

30 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

31 **Indirect construction-related effects:** Noise and visual disturbances associated with construction-  
32 related activities could result in temporary disturbances that affect Modesto song sparrow use of  
33 modeled habitat. Construction noise above background noise levels (greater than 50 dBA) could  
34 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment  
35 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),  
36 although there are no available data to determine the extent to which these noise levels could affect  
37 Modesto song sparrow. Indirect effects associated with construction include noise, dust, and visual  
38 disturbance caused by grading, filling, contouring, and other ground-disturbing operations.  
39 Construction-related noise and visual disturbances could disrupt nesting and foraging behaviors,  
40 and reduce the functions of suitable habitat which could result in an adverse effect on these species.  
41 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*

1 *Nesting Birds*, would be available to minimize potential effects on active nests. The use of mechanical  
2 equipment during water conveyance construction could cause the accidental release of petroleum or  
3 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1–  
4 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize  
5 the likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to  
6 Modesto song sparrow could also have a negative effect on these species. AMM1–AMM7 would  
7 ensure that measures are in place to prevent runoff from the construction area and the negative  
8 effects of dust on wildlife adjacent to work areas.

9 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
10 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
11 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
12 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
13 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
14 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
15 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
16 associated with natural community and floodplain restoration could indirectly affect Modesto song  
17 sparrow, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

18 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
19 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
20 *Management* includes provisions for project-specific Mercury Management Plans. Site-specific  
21 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
22 adaptive management as described in CM12 would be available to address the uncertainty of  
23 methylmercury levels in restored tidal marsh and potential effects on Modesto song sparrow.

24 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative  
25 1C water conveyance facilities could adversely affect individuals in the absence of other  
26 conservation actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of  
27 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
28 *Nesting Birds*, would minimize this potential effect. The implementation of tidal natural communities  
29 restoration or floodplain restoration could result in increased exposure of Modesto song sparrow to  
30 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
31 species and the potential for increased exposure varies substantially within the study area. Site-  
32 specific restoration plans that address the creation and mobilization of mercury, as well as  
33 monitoring and adaptive management as described in *CM12 Methylmercury Management* would  
34 address the potential impacts of methylmercury levels in restored tidal marsh in the study area. The  
35 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
36 potential for risk of methylmercury exposure for Modesto song sparrow, once site specific sampling  
37 and other information could be developed.

38 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the water  
39 conveyance facilities could have a significant impact on these species. The incorporation of AMM1–  
40 AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
41 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
42 impact to a less-than-significant level. The implementation of tidal natural communities restoration  
43 or floodplain restoration could result in increased exposure of Modesto song sparrow to  
44 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
45 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well

1 as monitoring and adaptive management as described in *CM12 Methylmercury Management* would  
2 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.

3 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
4 **Disturbance of Nesting Birds**

5 See Mitigation Measure BIO-75 under Impact BIO-75.

6 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**  
7 **Implementation of Conservation Components**

8 Flooding of the Yolo Bypass (CM2) would inundate 81-158 acres of modeled Modesto song sparrow  
9 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat  
10 availability would be expected during the fledgling period of the nesting season due to periodic  
11 inundation.

12 Based on hypothetical floodplain restoration, construction of setback levees from seasonally  
13 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately  
14 284 acres of Modesto song sparrow modeled habitat (Table 12-1A-52).

15 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to  
16 restore a more natural flood regime in support of wetland and riparian vegetation types that  
17 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during  
18 years when flooding extends into the nesting season (after March).

19 **NEPA Effects:** Periodic effects of inundation would not result in an adverse effect on Modesto song  
20 sparrow because increased frequency and duration of inundation would be expected to restore a  
21 more natural flood regime in support of wetland and riparian vegetation types that provide Modesto  
22 song sparrow habitat.

23 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on  
24 Modesto song sparrow because increased frequency and duration of inundation would be expected  
25 to restore a more natural flood regime in support of wetland and riparian vegetation types that  
26 provide Modesto song sparrow habitat.

27 **Bank Swallow**

28 This section describes the effects of Alternative 1A, including construction and implementation of  
29 other conservation components, on bank swallow. Bank swallows nest in colonies along rivers,  
30 streams, or other water and require fine textured sandy soils in vertical banks to create their  
31 burrows. There is little suitable habitat for bank swallow in the study area because most of the  
32 erodible banks have been stabilized with of levee revetment. The placement of rock revetment  
33 prevents the lateral migration of rivers, removing the natural river process that creates vertical  
34 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences  
35 2007).An estimated 70-90% of the bank swallow population in California nests along the  
36 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of  
37 the study area. However, there are three CNDDB records of bank swallow colonies in the study area:  
38 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.  
39 Construction and restoration associated with Alternative 1A conservation measures would not  
40 result in the direct loss of modeled habitat for bank swallow (Table 12-1A-53). However, indirect  
41 effects of noise and visual disturbance resulting from *CM2 Yolo Bypass Fisheries Enhancement* and

1 *CM4 Tidal Natural Communities Restoration* could impact bank swallow colonies if they were present  
2 near work areas. In addition, there is uncertainty with respect to how water flows upstream of the  
3 study area would affect bank swallow habitat.

4 As explained below, impacts on bank swallow would not be adverse for NEPA purposes and would  
5 be less than significant for CEQA purposes with the implementation of mitigation measures to  
6 monitor colonies and address the uncertainty of upstream operations on the species.

7 **Table 12-1A-53. Changes in Bank Swallow Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

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

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**  
10 **Swallow**

11 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*  
12 *Enhancement*, and *CM4 Tidal Natural Communities Restoration*, including operation of earthmoving  
13 equipment and human activities at work sites, could result in temporary disturbances that cause  
14 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies  
15 with occupied burrows have been recorded in CZ 2 and CZ 5 and construction-related  
16 disturbances could result in an adverse effect on individuals. Various activities related to *CM11*  
17 *Natural Communities Enhancement and Management* could also have indirect effects on bank  
18 swallow. Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect*  
19 *Effects on Bank Swallow Will Be Minimized*, would reduce these indirect effects on construction on  
20 bank swallow.

21 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank  
22 swallow colonies. Noise and visual disturbances could result in adverse effects on bank swallows if  
23 active colonies were present within 500 feet of work areas. Mitigation Measure BIO-146, *Active Bank*  
24 *Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would be  
25 available to address this potential effect.



1 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a  
2 significant impact on bank swallow colonies. Noise and visual disturbances could result in  
3 significant impacts on bank swallows if active colonies were present within 500 feet of work areas.  
4 Implementation of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and*  
5 *Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this impact to a less-than-  
6 significant level.

7 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**  
8 **Effects on Bank Swallow Will Be Minimized**

9 To the extent practicable, BDCP proponents will not construct conservation components during  
10 the bank swallow nesting season (April 1 through August 31). If construction activities cannot  
11 be avoided during nesting season, a qualified biologist will conduct preconstruction surveys to  
12 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If  
13 no active nesting colonies are present, no further mitigation is required.

14 If active colonies are detected, BDCP proponents will establish a nondisturbance buffer  
15 (determined in coordination with CDFW and the Bank Swallow Technical Advisory Committee)  
16 around the colony during the breeding season. In addition, a qualified biologist will monitor any  
17 active colony within 500 feet of construction to ensure that construction activities do not affect  
18 nest success.

19 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**  
20 **on Bank Swallow**

21 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes  
22 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the  
23 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.

24 Because of this limited available habitat, and the reduction of natural river process, the species is  
25 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat  
26 creation, and 2) high flows during the breeding season. The potential impacts of changes in  
27 upstream flows during the breeding season on bank swallows are the flooding of active burrows and  
28 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin  
29 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank  
30 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March when  
31 the swallows have nested and laid eggs in the burrows could result in the loss of nests. On the  
32 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with  
33 localized bank collapses which resulted in partial or complete colony failure (Stillwater Sciences  
34 2007).

35 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations  
36 on the Sacramento (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,  
37 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-  
38 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).  
39 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical  
40 years. An average also was estimated (see Section 5.3.1, Chapter 5, *Water Supply*, for a description of  
41 the model).

1 On the Sacramento River, at the Keswick and Red Bluff gauges, mean monthly flows under  
2 Alternative 1A would increase between April and August in all but wet years at the Keswick flow  
3 gauge (Table 1 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish*  
4 *Analysis*) and in dry and critical years at the gauge upstream of Red Bluff (Table 3 of Section 11C.1.1  
5 in Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*) which could lead to  
6 inundation of active colonies. However, the flows under Existing Conditions and the predicted flows  
7 in the late long-term without the project (NAA) also show increases in flows during the breeding  
8 season (April through August) in these water year types. Similar trends are shown for the Feather  
9 River (Table 15 in Section 11C.1.1 and Table 17 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model*  
10 *Results Utilized in the Fish Analysis*). In addition, on the Sacramento River in average, above normal,  
11 and wet water years, flows at the Verona gauge are predicted to be greater than 14,000 cfs during  
12 some months of the breeding season, which could lead to bank collapse events (Tables 1, 3, and 7 in  
13 Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). However,  
14 flows of this height are recorded under Existing Conditions at this flow gauge and are also predicted  
15 for the late long-term time without the project (NAA).

16 **NEPA Effects:** High spring flows in the Sacramento and Feather Rivers may already be impacting  
17 bank swallow colonies during the breeding season, and predicted flows under Alternative 1A would  
18 not be substantially greater than under the No Action Alternative. However, because of the  
19 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
20 the potential for and magnitude of upstream impacts on bank swallow resulting from changes in  
21 operations. Soil type, high winter flows, and low spring flows all contribute to successful nesting of  
22 bank swallow, and even moderate changes in seasonal flows could have an adverse effect on  
23 breeding success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and*  
24 *Evaluate Winter and Spring Flows Upstream of the Study Area*, would be available to address the  
25 uncertainty of potential adverse upstream effects of operations on bank swallow.

26 **CEQA Conclusion:** High spring flows in the Sacramento and Feather Rivers may already be  
27 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative  
28 1A would not be substantially greater than under the No Action Alternative. However, because of the  
29 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
30 the potential for and magnitude of upstream impacts on bank swallow resulting from changes in  
31 operations. There are many variables that dictate suitable habitat for the species that cannot be  
32 clearly quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank  
33 swallow depending on soil type and location of current colonies. Implementation of Mitigation  
34 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*  
35 *the Study Area*, would address this potentially significant impact and further determine if additional  
36 mitigation is required for bank swallow.

37 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**  
38 **Spring Flows Upstream of the Study Area**

39 To address the uncertainty of the impact of upstream spring flows on existing bank swallow  
40 habitat, DWR will monitor existing colonies upstream of the study area and collect habitat  
41 suitability data including soil type, number of active burrows per colony, and height of average  
42 burrows. In addition, to determine the degree to which reduced winter flows are contributing to  
43 habitat loss, DWR will quantify the winter flows required for river meander to create suitable  
44 habitat through lateral channel migration and bank resurfacing. If impacts of upstream flows on  
45 bank swallow are identified, further mitigation may be required after consultation with CDFW

1 and the Bank Swallow Technical Advisory Committee. Recommended mitigation for changes in  
2 flow regimes associated with water conveyance includes conservation easements on currently  
3 occupied habitat or revetment removal projects to create habitat for bank swallow (Bank  
4 Swallow Technical Advisory Committee 2013).

### 5 **Yellow-Headed Blackbird**

6 This section describes the effects of Alternative 1A, including water conveyance facilities  
7 construction and implementation of other conservation components, on yellow-headed blackbird.  
8 The habitat model used to assess impacts on yellow-headed blackbird includes nesting habitat and  
9 foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural  
10 seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland. Modeled  
11 foraging habitat for yellow-headed blackbird consists of cultivated lands and noncultivated land  
12 cover types known to support abundant insect populations, including corn, pasture, and feedlots.

13 Construction and restoration associated with Alternative 1A conservation measures would result in  
14 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in  
15 Table 12-1A-54. Full implementation of Alternative 1A would include the following biological  
16 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (BDCP  
17 Chapter 3, *Conservation Strategy*).

- 18 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
19 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 20 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
21 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
22 associated with CM10).
- 23 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
24 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 25 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
26 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
27 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 28 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 29 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
30 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 31 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
32 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
33 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
34 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
35 with CM3).
- 36 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat in CZs 1, 2, 3,  
37 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).
- 38 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
39 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
40 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,

1 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
2 with CM3).

- 3 • Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4,  
4 associated with CM11).

5 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
6 management activities to enhance habitats for the species and implementation of AMM1–AMM7,  
7 *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird  
8 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

9 **Table 12-1A-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative**  
10 **1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	11	11	89	89	NA	NA
	Foraging	1,696	1,696	685	685	NA	NA
<b>Total Impacts CM1</b>		<b>1,707</b>	<b>1,707</b>	<b>774</b>	<b>774</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	5,814	13,902	45	45	961–2,678	18
	Foraging	5,612	26,673	376	905	368–1,476	2,701
<b>Total Impacts CM2–CM18</b>		<b>11,426</b>	<b>40,575</b>	<b>421</b>	<b>951</b>	<b>1,495–4,394</b>	<b>2,719</b>
<b>Total Nesting</b>		<b>5,825</b>	<b>13,913</b>	<b>134</b>	<b>135</b>	961–2,678	18
<b>Total Foraging</b>		<b>7,308</b>	<b>28,369</b>	<b>1,061</b>	<b>1,590</b>	368–1,476	2,701
<b>TOTAL IMPACTS</b>		<b>13,133</b>	<b>42,282</b>	<b>1,195</b>	<b>1,725</b>	<b>1,495–4,394</b>	<b>2,719</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

11

12 **Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird**

13 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
14 of up to 44,007 acres of modeled habitat (14,048 acres of nesting habitat and 29,959 acres of  
15 foraging habitat) for yellow-headed blackbird (Table 12-1A-54). Conservation measures that would  
16 result in these losses are conveyance facilities and transmission line construction, and establishment  
17 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
18 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration  
19 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat  
20 enhancement and management activities (CM11) which include ground disturbance or removal of

1 nonnative vegetation could result in local adverse habitat effects. In addition, maintenance activities  
2 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
3 facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these  
4 individual activities is described below. A summary statement of the combined impacts and NEPA  
5 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 6 • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 1A water  
7 conveyance facilities would result in the combined permanent and temporary loss of up to 100  
8 acres of yellow-headed blackbird nesting habitat (11 acres of permanent loss and 89 acres of  
9 temporary loss). In addition, 2,381 acres of foraging habitat would be removed (1,696 acres of  
10 permanent loss, 685 acres of temporary loss). (Table 12-1A-54). Activities that would impact  
11 suitable yellow-headed blackbird habitat consist of tunnel, forebay, and intake construction,  
12 temporary access roads, and construction of transmission lines. The largest losses of foraging  
13 habitat would occur from loss of corn. There are no occurrences of yellow-headed blackbird that  
14 overlap with the construction footprint for CM1. However, Mitigation Measure BIO-75, *Conduct*  
15 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require  
16 preconstruction surveys and the establishment of no-disturbance buffers and would be  
17 available to address potential effects on yellow-headed blackbirds if they were to nest in or  
18 adjacent to construction areas. Impacts resulting from CM1 would occur in the central delta in  
19 CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. Refer to the Terrestrial Biology Map Book for a detailed view of  
20 Alternative 1A construction locations.
- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
22 would result in the combined permanent and temporary loss of up to 100 acres of nesting  
23 habitat (55 acres of permanent loss, 45 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
24 addition, 1,144 acres of foraging habitat would be removed (879 acres of permanent loss, 265  
25 acres of temporary loss). The loss is expected to occur during the first 10 years of Alternative 1A  
26 implementation.
- 27 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation from CM4 would  
28 permanently remove or convert an estimated 13,847 acres of nesting habitat, which would  
29 consist primarily of managed wetland. In addition, 20,029 acres of foraging habitat would be  
30 lost or converted as a result of tidal restoration, over half of which would be from the loss or  
31 conversion of alfalfa. However, the resulting 65,000 acres of tidal natural communities would  
32 also provide habitat for the species, 24,000 acres of which would be tidal freshwater natural  
33 communities providing breeding habitat for yellow-headed blackbird.
- 34 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
35 seasonally inundated floodplain and riparian restoration actions would remove approximately 2  
36 acres of yellow-headed blackbird nesting habitat (1 acres of permanent loss, 1 acres of  
37 temporary loss) and 1,641 acres of foraging habitat (1,051 acres of permanent loss, 590 acres of  
38 temporary loss). These losses would be expected after the first 10 years of Alternative 1A  
39 implementation along the San Joaquin River and other major waterways in CZ 7.
- 40 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
41 approximately 509 acres of yellow-headed blackbird foraging habitat as part of tidal restoration  
42 and 2,033 acres as part of seasonal floodplain restoration through CM7.
- 43 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
44 implemented on agricultural lands and would result in the conversion of 926 acres of yellow-  
45 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,

1 and 11. If agricultural lands supporting higher value foraging habitat than the restored  
2 grassland were removed, there would be a loss of white-tailed kite foraging habitat value.

- 3 ● CM8 would result in the restoration of 2,000 acres of grassland foraging habitat in the study  
4 area.
- 5 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
6 result in the permanent conversion of 988 acres of cultivated lands foraging habitat to nontidal  
7 marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins  
8 of restored nontidal marsh and restoration would also provide foraging habitat for the species.
- 9 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
10 enhancement-related activities could disturb yellow-headed blackbird nests if they were  
11 present near work sites. A variety of habitat management actions included in CM11 that are  
12 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
13 disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat  
14 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,  
15 such as removal of nonnative vegetation and road and other infrastructure maintenance, would  
16 be expected to have minor effects on available yellow-headed blackbird habitat. These effects  
17 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
18 the AMMs listed below. CM11 would also include the construction of recreational-related  
19 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*  
20 *and Associated Federal Actions*). The construction of trailhead facilities, signs, staging areas,  
21 picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and where  
22 possible. However, approximately 50 acres of grassland foraging habitat would be lost from the  
23 construction of trails and facilities.
- 24 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
25 yellow-headed blackbird foraging habitat for the development of a delta and longfin smelt  
26 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan  
27 implementation.
- 28 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
30 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.  
31 Maintenance activities would include vegetation management, levee and structure repair, and  
32 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
33 AMMs and conservation actions as described below.
- 34 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
35 direct mortality of adult or fledged yellow-headed blackbird if they were present in the Plan  
36 Area, because they would be expected to avoid contact with construction and other equipment.  
37 If yellow-headed blackbird were to nest in the construction area, construction-related activities,  
38 including equipment operation, noise and visual disturbances could destroy nests or lead to  
39 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,  
40 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
41 available to address these potential effects on yellow-headed blackbird.

42 The following paragraphs summarize the combined effects discussed above and describe other  
43 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
44 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. The Plan would remove 5,959 acres  
6 (5,825 acres of permanent loss, 134 acres of temporary loss) of yellow-headed blackbird nesting  
7 habitat in the study area in the near-term. These effects would result from the construction of the  
8 water conveyance facilities (CM1, 100 acres), and implementing other conservation measures (CM2  
9 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
10 *Inundated Floodplain Restoration*—5,859 acres). In addition, 8,369 acres of yellow-headed blackbird  
11 foraging habitat would be removed or converted in the near-term (CM1, 2,381 acres; CM2 *Yolo*  
12 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5, *Seasonally*  
13 *Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland*  
14 *Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation*  
15 *Hatcheries*—5,988 acres).

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
17 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
18 of foraging habitat. Using these ratios would indicate that 100 acres of nesting habitat should be  
19 restored/created and 100 acres should be protected to compensate for the CM1 losses of yellow-  
20 headed blackbird nesting habitat. In addition, 2,381 acres of foraging habitat should be protected to  
21 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
22 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
23 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
24 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

25 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
26 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
27 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
28 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
29 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3).  
30 These conservation actions are associated with CM3, CM4, CM8, and CM10 and would occur in the  
31 same timeframe as the construction and early restoration losses.

32 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
33 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
34 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
35 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
36 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
37 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
38 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
39 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
40 created, some of which would provide nesting habitat for the species.

41 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
42 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
43 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
44 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
45 would provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and

1 abundance would also be increased on protected lands, enhancing the foraging value of these  
2 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
3 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
4 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
5 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
6 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
7 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

8 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife  
9 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
10 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
11 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the  
12 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
13 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
19 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
20 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The yellow-headed  
21 blackbird is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
22 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
23 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
24 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this potential effect.

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

26 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
27 of modeled foraging habitat for yellow-headed blackbird. Alternative 1A as a whole would result in  
28 the permanent loss of and temporary effects on 14,048 acres of potential nesting habitat (17% of the  
29 potential nesting habitat in the study area) and the loss or conversion of 29,959 acres of foraging  
30 habitat (9% of the foraging habitat in the study area). The locations of these losses are described  
31 above in the analyses of individual conservation measures.

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
33 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Communities*  
34 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
35 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
36 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
37 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
38 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
39 habitat for native wildlife species (Table 3-4 in Chapter 3).

40 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
41 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
42 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
43 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
44 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground



1 or marsh where the predominant vegetation consists of invasive species such as perennial  
2 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
3 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
4 which would provide nesting habitat for the species.

5 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
6 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
7 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
8 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
9 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
10 abundance would also be increased on protected lands, enhancing the foraging value of these  
11 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
12 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
13 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
14 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
15 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
16 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
17 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
18 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
19 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,  
20 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-  
21 headed blackbird.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
27 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
28 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

29 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
30 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
31 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
32 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
33 address this effect.

34 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential for direct mortality of this  
35 special-status species associated with Alternative 1A would represent an adverse effect in the  
36 absence of other conservation actions. With habitat protection and restoration associated with CM3,  
37 CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which  
38 would be in place throughout the construction period, the effects of habitat loss would not be  
39 adverse under Alternative 1A. The yellow-headed blackbird is not a covered species under the  
40 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
41 noncovered avian species would be required to ensure that nests are detected and avoided.  
42 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
43 *Nesting Birds*, would be available to address this effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
6 effects of construction would be less than significant under CEQA. The Plan would remove 5,959  
7 acres (5,825 acres of permanent loss, 134 acres of temporary loss) of yellow-headed blackbird  
8 nesting habitat in the study area in the near-term. These effects would result from the construction  
9 of the water conveyance facilities (CM1, 58 acres), and implementing other conservation measures  
10 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5  
11 Seasonally Inundated Floodplain Restoration—5,859 acres). In addition, 8,369 acres of yellow-  
12 headed blackbird foraging habitat would be removed or converted in the near-term (CM1, 2,381  
13 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5  
14 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8  
15 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation  
16 Hatcheries—5,988 acres).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
18 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
19 of foraging habitat. Using these ratios would indicate that 100 acres of nesting habitat should be  
20 restored/created and 100 acres should be protected to compensate for the CM1 losses of yellow-  
21 headed blackbird nesting habitat. In addition, 2,381 acres of foraging habitat should be protected to  
22 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
23 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
24 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
25 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

26 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
27 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
28 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
29 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
30 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3).  
31 These conservation actions are associated with CM3, CM4, CM8, and CM10 and would occur in the  
32 same timeframe as the construction and early restoration losses.

33 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
34 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
35 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
36 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
37 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
38 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
39 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
40 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
41 created, some of which would provide nesting habitat for the species.

42 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
43 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
44 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a

1 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
2 would provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
3 abundance would also be increased on protected lands, enhancing the foraging value of these  
4 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
5 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
6 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
7 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
8 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
9 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

10 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife  
11 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
12 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
13 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the  
14 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
15 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
21 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
22 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

23 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid a  
24 significant impact on individuals, preconstruction surveys for noncovered avian species would be  
25 required to ensure that nests are detected and avoided. The implementation of Mitigation Measure  
26 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
27 reduce potential effects on nesting yellow-headed blackbird to a less-than-significant level.

### 28 **Late Long-Term Timeframe**

29 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
30 of modeled foraging habitat for yellow-headed blackbird. Alternative 1A as a whole would result in  
31 the permanent loss of and temporary effects on 14,048 acres of potential nesting habitat (17% of the  
32 potential nesting habitat in the study area) and the loss or conversion of 29,959 acres of foraging  
33 habitat (9% of the foraging habitat in the study area). The locations of these losses are described  
34 above in the analyses of individual conservation measures.

35 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
36 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Communities*  
37 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
38 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
39 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
40 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
41 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
42 habitat for native wildlife species (Table 3-4 in Chapter 3).

1 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
2 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
3 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
4 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
5 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
6 or marsh where the predominant vegetation consists of invasive species such as perennial  
7 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
8 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
9 which would provide nesting habitat for the species.

10 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
11 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and  
12 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
13 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
14 would provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
15 abundance would also be increased on protected lands, enhancing the foraging value of these  
16 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
17 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
18 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
19 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
20 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
21 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
22 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
23 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
24 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,  
25 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-  
26 headed blackbird.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

34 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid a  
35 significant impact on individuals, preconstruction surveys for noncovered avian species would be  
36 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
37 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
38 potential impact to a less-than-significant level.

39 Considering Alternative 1A's protection and restoration provisions, which would provide acreages  
40 of new or enhanced habitat in amounts necessary to compensate for habitat lost to construction and  
41 restoration activities, and with the implementation of AMM1-AMM7 and Mitigation Measure BIO-  
42 75, the loss of habitat or direct mortality through implementation of Alternative 1A would not result  
43 in a substantial adverse effect through habitat modifications and would not substantially reduce the  
44 number or restrict the range of yellow-headed blackbird. Therefore, the loss of habitat or potential

1 mortality under this alternative would have a less-than-significant impact on yellow-headed  
2 blackbird.

3 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
4 **Disturbance of Nesting Birds**

5 See Mitigation Measure BIO-75 under Impact BIO-75.

6 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**  
7 **Facilities**

8 New transmission lines would increase the risk for bird-power line strikes, which could result in  
9 injury or mortality of yellow-headed blackbirds. Transmission line poles and towers also provide  
10 perching substrate for raptors, which could result in increased predation pressure on yellow-headed  
11 blackbirds. The existing network of transmission lines in the Plan Area currently poses this risk for  
12 yellow-headed blackbirds, and any incremental risk associated with the new transmission line  
13 corridors would be expected to be low. *AMM20 Greater Sandhill Crane* would further minimize the  
14 risk for bird-power line strikes with the installation of flight diverters on new and selected existing  
15 transmission lines.

16 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
17 could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
18 also provide perching substrate for raptors, which could result in increased predation pressure on  
19 yellow-headed blackbirds. The existing network of transmission lines in the Plan Area currently  
20 poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
21 transmission line corridors would not be expected to have an adverse effect on yellow-headed  
22 blackbirds. *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power line  
23 strikes.

24 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
25 could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
26 also provide perching substrate for raptors, which could result in increased predation pressure on  
27 yellow-headed blackbirds. The existing network of transmission lines in the Plan Area currently  
28 poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
29 transmission line corridors would have a less-than-significant impact on yellow-headed blackbird.  
30 *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power line strikes.

31 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

32 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
33 with construction-related activities could result in temporary disturbances that affect yellow-  
34 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater  
35 than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP  
36 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
37 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
38 noise levels could affect yellow-headed blackbird. Indirect effects associated with construction  
39 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
40 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and  
41 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse  
42 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*

1 *Avoid Disturbance of Nesting Birds*, would be available to minimize potential effects on active nests.  
2 The use of mechanical equipment during water conveyance construction could cause the accidental  
3 release of petroleum or other contaminants that could affect the species in the surrounding habitat.  
4 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would  
5 minimize the likelihood of such spills. The inadvertent discharge of sediment or excessive dust  
6 adjacent to yellow-headed blackbird habitat could also have a negative effect on the species. AMM1–  
7 AMM7 would ensure that measures are in place to prevent runoff from the construction area and the  
8 negative effects of dust on wildlife adjacent to work areas.

9 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
10 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and  
11 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
12 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
13 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
14 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
15 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
16 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
17 specific effects. Increased methylmercury associated with natural community and floodplain  
18 restoration could indirectly affect yellow-headed blackbird, via uptake in lower trophic levels (as  
19 described in the BDCP, Appendix 5.D, *Contaminants*).

20 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
21 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
22 *Management* includes provisions for project-specific Mercury Management Plans. Site-specific  
23 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
24 adaptive management as described in CM12 would be available to address the uncertainty of  
25 methylmercury levels in restored tidal marsh and potential effects on yellow-headed blackbird.

26 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
27 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,  
28 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
29 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed  
30 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
31 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address potential  
32 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
33 communities restoration or floodplain restoration could result in increased exposure of yellow-  
34 headed blackbird to methylmercury, in restored tidal areas. However, it is unknown what  
35 concentrations of methylmercury are harmful to these species and the potential for increased  
36 exposure varies substantially within the study area. Site-specific restoration plans that address the  
37 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
38 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
39 area and better inform potential impacts on yellow-headed blackbird. The site-specific planning  
40 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
41 methylmercury exposure for yellow-headed blackbird, once site specific sampling and other  
42 information could be developed.

43 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
44 operations and maintenance of the water conveyance facilities under Alternative 1A would have a  
45 less-than-significant impact on yellow-headed blackbird with the implementation of Mitigation

1 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
2 *Birds*, and AMM1–AMM7. The implementation of tidal natural communities restoration or floodplain  
3 restoration could result in increased exposure of yellow-headed blackbird to methylmercury.  
4 However, it is unknown what concentrations of methylmercury are harmful to this species. Site-  
5 specific restoration plans that address the creation and mobilization of mercury, as well as  
6 monitoring and adaptive management as described in CM12, would better inform potential impacts  
7 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area.

8 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
9 **Disturbance of Nesting Birds**

10 See Mitigation Measure BIO-75 under Impact BIO-75.

11 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**  
12 **as a Result of Implementation of Conservation Components**

13 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–  
14 2,678 acres of foraging habitat (Table 12-1A-54). Based on hypothetical floodplain restoration,  
15 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
16 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of foraging habitat  
17 (Table 12-1A-54) resulting in the temporary loss of these habitats. Foraging yellow-headed  
18 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is  
19 inundated, as they do under the current flooding regime. However, this inundation could reduce the  
20 availability of nesting habitat during years when flooding extends into the nesting season (past  
21 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is  
22 expected to restore a more natural flood regime in support of wetland and riparian vegetation types  
23 that support nesting habitat.

24 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
25 foraging habitat for yellow-headed blackbird. Periodic inundation would not have an adverse effect  
26 on yellow-headed blackbird because inundation is expected to take place outside of the breeding  
27 season, and, although foraging habitat may be temporarily unavailable, birds would be expected to  
28 move to adjacent foraging habitat.

29 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
30 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-  
31 significant impact on yellow-headed blackbird because inundation is expected to take place outside  
32 of the breeding season, and, although foraging habitat would be temporarily unavailable, birds  
33 would be expected to move to adjacent foraging habitat.

34 **Riparian Brush Rabbit**

35 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation  
36 associations within the valley/foothill riparian natural community and adjacent grasslands. The  
37 vegetation associations were selected based on a review of understory and overstory composition  
38 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

39 Just until recently, the only known naturally occurring populations of riparian brush rabbits were  
40 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland  
41 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of

1 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-  
2 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry  
3 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury  
4 pers. comm.). This is only the 2<sup>nd</sup> naturally occurring population documented outside of Caswell  
5 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush  
6 rabbit, to the extent information was available, included size and degree of isolation of habitat  
7 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

8 Construction and restoration associated with Alternative 1A conservation measures would result in  
9 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table  
10 12-1A-55. Full implementation of Alternative 1A would also include biological objectives over the  
11 term of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The  
12 conservation strategy for the riparian brush rabbit, with conservation principles involves  
13 protecting, restoring or creating, and maintaining habitat and corridors near the largest remaining  
14 fragments of habitat and extant populations; providing high-water refugia from flooding; and  
15 managing feral predators (dogs and cats) in areas occupied by the species. The conservation  
16 measures that would be implemented to achieve the biological goals and objectives are summarized  
17 below.

- 18 ● Provide a range of elevations in restored floodplains that transition from frequently flooded  
19 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
20 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
21 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 22 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
23 between existing conservation lands (Objective L1.6, associated with CM3).
- 24 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
25 recolonization of vegetation, desirable natural community vegetation is regenerated, and  
26 structural diversity is promoted, or implement management actions that mimic those natural  
27 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 28 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
29 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
30 associated with CM3-CM8, and CM11).
- 31 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
32 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
33 with CM3 and CM7).
- 34 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
35 (Objective VFRNC1.2, associated with CM3).
- 36 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
37 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
38 with CM5, CM7, and CM11).
- 39 ● Of the 750 acres of protected valley/foothill riparian natural community protected under  
40 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined  
41 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous  
42 with occupied habitat (Objective RBR1.1, associated with 3).



- 1       ● Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,  
2       maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are  
3       adjacent to or that facilitate connectivity with occupied or potentially occupied habitat  
4       (Objective RBR1.2, associated with CM3, CM7, and CM11).
- 5       ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
6       VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian  
7       habitat that meets the ecological requirements of the riparian brush rabbit and that is within or  
8       adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat  
9       (Objective 1.3, associated with CM3, CM7, and CM11).
- 10      ● Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit  
11      habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,  
12      construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that  
13      refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
- 14      ● In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control  
15      nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,  
16      associated with CM11).
- 17      ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of  
18      grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side  
19      of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for  
20      riparian brush rabbit (Objective RBR1.6m associated with CM3 and CM8).

21      As explained below, with the restoration and protection of these amounts of habitat, in addition to  
22      the AMMs to reduce potential effects, impacts on riparian brush rabbit would not be adverse for  
23      NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 1A**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	7	7	1	1	NA	NA
	Grassland	150	150	30	30	NA	NA
<b>Total Impacts CM1</b>		<b>157</b>	<b>157</b>	<b>31</b>	<b>31</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>106</b>	<b>0</b>	<b>55</b>	<b>0</b>	<b>687</b>
<b>TOTAL IMPACTS</b>		<b>157</b>	<b>263</b>	<b>31</b>	<b>86</b>	<b>0</b>	<b>687</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**  
5 **Rabbit**

6 Alternative 1A conservation measures would result in the permanent and temporary loss of up to  
7 105 acres of riparian habitat and 244 acres of associated grassland habitat for the riparian brush  
8 rabbit in the study area (Table 12-1A-55). The hypothetical footprint for levee construction under  
9 CM5, overlaps with one occurrence record for riparian brush rabbit, south of the  
10 Interstate 5/Interstate 205 interchange. Conservation measures resulting in permanent habitat loss  
11 include conveyance facilities construction (CM1), tidal natural communities restoration (CM4), and  
12 floodplain restoration (CM5). Each of these individual activities is described below. A summary  
13 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual  
14 conservation measure discussions. Conservation measures resulting in permanent habitat loss  
15 include conveyance facilities construction (CM1), tidal natural communities restoration (CM4), and  
16 floodplain restoration (CM5). Each of these individual activities is described below. A summary  
17 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual  
18 conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Development of Alternative 1A water conveyance facilities  
20 would result in the permanent removal of approximately 7 acres of riparian habitat and  
21 150 acres of associated grassland habitat and in the temporary removal of 1 acre of riparian  
22 habitat and 30 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-1A-55). The  
23 riparian habitat that would be removed is of low value for the riparian brush rabbit as it consists  
24 of several small, isolated patches surrounded by agricultural lands northeast of Clifton Court

1 Forebay. The associated grasslands are also of low value for the species: They consist of long,  
2 linear strips that abut riparian habitat, but extend several miles from the riparian habitat and,  
3 therefore, provide few if any opportunities for adjacent cover. Trapping efforts conducted for  
4 the riparian brush rabbit in this area were negative (BDCP Appendix 3.E, *Conservation Principles*  
5 *for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Map Book  
6 for a detailed view of Alternative 1A construction locations.

- 7 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
8 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres  
9 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The  
10 riparian habitat that would be removed consists of relatively small and isolated patches along  
11 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts  
12 Island areas, and several small patches along the San Joaquin River. The habitat that would be  
13 removed is not adjacent to any existing conserved lands, and is several miles north and  
14 northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut  
15 (Williams et al. 2002). Although the final footprint for tidal natural communities restoration  
16 would differ from the hypothetical footprint, compliance monitoring would be implemented to  
17 ensure that acreage limits are not exceeded and the measures described in *AMM25 Riparian*  
18 *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid  
19 removal of any habitat occupied by the riparian brush rabbit.
- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
21 restoration would result in the permanent removal of approximately 43 acres of riparian habitat  
22 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late  
23 longterm. Levee construction would also result in the temporary removal of 35 acre riparian  
24 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are  
25 considered temporary, five years to several decades may be required for ecological succession  
26 to occur and for restored riparian habitat to replace the function of habitat that has been  
27 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small  
28 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous  
29 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for  
30 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the  
31 Interstate 5/Interstate 205 interchange.

32 Although the final floodplain restoration design would differ from the hypothetical footprint  
33 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the  
34 general area of the riparian brush rabbit population. Implementation of adaptive management  
35 described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed as a  
36 result of floodplain restoration does not exceed maximum allowable habitat loss for this species.

- 37 ● *CM11 Natural Communities Enhancement and Management* A variety of habitat management  
38 actions included in *CM11* that are designed to enhance wildlife values in BDCP protected  
39 habitats may result in localized ground disturbances that could temporarily remove small  
40 amounts of riparian brush rabbit habitat. Passive recreation in the reserve system could result  
41 in disturbance of individual riparian brush rabbits foraging in the ecotone between riparian and  
42 adjacent open habitats. However, *AMM37 Recreation* limits trail development adjacent to  
43 riparian corridors within the range of the riparian brush rabbit. With this minimization measure  
44 in place, recreation related effects on the riparian brush rabbit are expected to be minimal.  
45 Enhancement and management actions in riparian brush rabbit habitat within the reserve  
46 system may include invasive plant removal, planting and maintaining vegetation to improve and

1 sustain habitat characteristics for the species, and creating and maintaining flood refugia. These  
2 activities are expected to have minor adverse effects on available riparian brush rabbit habitat  
3 and are expected to result in overall improvements to and maintenance of riparian brush rabbit  
4 habitat values over the term of the BDCP. These effects cannot be quantified, but are expected to  
5 be minimal and would be avoided and minimized through the AMMs listed below.

- 6 ● Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to  
7 adversely affect the riparian brush rabbit because the species is not expected to occur in the  
8 vicinity of proposed facilities.
- 9 ● Recreation: Passive recreation in the reserve system could result in disturbance of individual  
10 riparian brush rabbits foraging in the ecotone between riparian and adjacent open habitats.  
11 However, AMM37, described in BDCP Appendix 3.C, *Avoidance and Minimization Measures*,  
12 limits trail development adjacent to riparian corridors within the range of the riparian brush  
13 rabbit. With this minimization measure in place, recreation related effects on the riparian brush  
14 rabbit are expected to be minimal.
- 15 ● Injury and direct mortality: Water conveyance facility construction is not is not likely to result in  
16 injury or mortality of individual riparian brush rabbits because the species is not likely to be  
17 present in the areas that would be affected by this activity, based on live trapping results (BDCP  
18 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal  
19 natural communities restoration would not result in injury or mortality of the riparian brush  
20 rabbit because tidal natural communities restoration projects would be designed to avoid  
21 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and  
22 relocated as described in AMM25(see BDCP Appendix 3.C). Activities associated with  
23 construction of setback levees for floodplain restoration could result in injury or mortality of  
24 riparian brush rabbits: however, preconstruction surveys, construction monitoring, and other  
25 measures would be implemented to avoid and minimize injury or mortality of this species  
26 during construction (AMM25).

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

### 30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 effects of construction would not be adverse under NEPA. Alternative 1A would result in permanent  
35 and temporary effects combined on 8 acres of riparian habitat and 180 acres of grassland habitat for  
36 riparian brush rabbit in the near-term as a result of construction of the water conveyance facilities  
37 (CM1). The habitat would be lost in the valley/foothill riparian and grassland natural communities.  
38 All the near-term loss of riparian brush rabbit habitat would occur in an area not likely to be  
39 occupied by the species. Habitat loss in CZ 7, in areas known or likely to be occupied, would occur  
40 during the early long-term and late long-term implementation periods. Riparian restoration would  
41 be phased to minimize temporal habitat loss. There would be no near-term losses resulting from  
42 CM2–CM18.

43 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
44 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of

1 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
2 community, and 2:1 for protection of grassland. Using these ratios would indicate that 8 acres of  
3 riparian habitat should be restored, 8 acres of riparian habitat should be protected, and 360 acres of  
4 grassland should be protected for riparian brush rabbit to mitigate near-term losses. The BDCP has  
5 committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and an unknown  
6 number of associated acres of grassland and protection of 750 acres of riparian (Objective  
7 VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in Chapter 3). In  
8 addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would inform the  
9 near-term protection and restoration efforts. The natural community restoration and protection  
10 activities are expected to be concluded during the first 10 years of Plan implementation, which is  
11 close enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA  
12 purposes. These commitments are more than sufficient to support the conclusion that the near-term  
13 effects of Alternative 1A would be not be adverse under NEPA, because the number of acres  
14 required to meet the typical ratios described above would be only 10 acres of riparian habitat  
15 restored, 10 acres of riparian habitat protected, and 334 acres of grassland protected.

16 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Presentation*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
21 *Communities*, *AMM25 Riparian Woodrat and Riparian Brush Rabbit*, and *AMM37 Recreation*. These  
22 AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats and  
23 species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
24 Appendix 3.C, *Avoidance and Minimization Measures*.

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

26 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
27 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1A a  
28 whole would result in permanent and temporary effects combined on 105 acres of modeled riparian  
29 habitat and 244 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and  
30 CZ 8. Habitat lost in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species.  
31 Habitat would also be lost in areas in CZ 7 that provide high-value habitat for the species.

32 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
33 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
34 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to  
35 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or  
36 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist  
37 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800  
38 acres to be conserved would consist of early successional riparian vegetation suitable for riparian  
39 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy  
40 area of protected and restored riparian natural community than what currently exists in CZ 7 and  
41 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific  
42 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at  
43 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological  
44 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal  
45 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines

1 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from  
2 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators  
3 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

4 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP  
5 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
6 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
7 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
8 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
9 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
10 on the landward side of levees adjacent to restored floodplain would be restored or protected as  
11 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

12 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
13 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to  
14 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
15 flooded areas would provide refuge for the riparian brush rabbit during most years. The Plan would  
16 also create and maintain mounds, levee sections, or other high areas in restored and protected  
17 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the  
18 riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*  
19 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush  
20 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that  
21 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
23 and protection actions discussed above, as well as the restoration of valley/foothill riparian and  
24 grassland that could overlap with the species model, would result in the restoration of 800 acres of  
25 riparian and 79 acres of grassland modeled habitat for riparian brush rabbit. In addition, protection  
26 of valley/foothill riparian and grassland could overlap with the species model and would result in  
27 the protection of 200 acres of riparian and 317 acres of grassland riparian brush rabbit modeled  
28 habitat.

29 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat under Alternative 1A would  
30 not be adverse because there is little likelihood of riparian brush rabbits being present and the  
31 BDCP has committed to protecting and restoring the acreage required to meet the typical mitigation  
32 ratios described above. In the late long-term, the losses of riparian brush rabbit riparian and  
33 grassland habitat associated with Alternative 1A, in the absence of other conservation actions,  
34 would represent an adverse effect as a result of habitat modification and potential direct mortality  
35 of a special-status species. However, with habitat protection and restoration associated with the  
36 conservation components, guided by landscape-scale goals and objectives and by AMM1-AMM7,  
37 AMM10, AMM25, and AMM37, the effects of Alternative 1A as a whole on riparian brush rabbit  
38 would not be adverse.

### 39 **CEQA Conclusion:**

#### 40 **Near-Term Timeframe**

41 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
42 term BDCP conservation strategy has been evaluated to determine whether it would provide

1 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
2 construction would be less than significant under CEQA.

3 Alternative 1A would result in permanent and temporary effects combined on 8 acres of riparian  
4 habitat and 180 acres of grassland habitat for riparian brush rabbit in the near-term as a result of  
5 construction of the water conveyance facilities (CM1). The habitat would be lost in the  
6 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush  
7 rabbit habitat would occur in an area not likely to be occupied by the species. Habitat loss in CZ 7, in  
8 areas known or likely to be occupied, would occur during the early long-term and late long-term  
9 implementation periods. Riparian restoration would be phased to minimize temporal habitat loss.  
10 There would be no near-term losses from CM2–CM18.

11 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
12 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
13 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
14 community, and 2:1 for protection of grassland. Using these ratios would indicate that 8 acres of  
15 riparian habitat should be restored, 8 acres of riparian habitat should be protected, and 360 acres of  
16 grassland should be protected for riparian brush rabbit to mitigate near-term losses.

17 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and  
18 an unknown number of associated acres of grassland and protection of 750 acres of riparian  
19 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
20 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would  
21 inform the near-term protection and restoration efforts. The natural community restoration and  
22 protection activities are expected to be concluded during the first 10 years of Plan implementation,  
23 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for  
24 CEQA purposes. These commitments are more than sufficient to support the conclusion that the  
25 near-term effects of Alternative 1A would be less than significant under CEQA, because the number  
26 of acres required to meet the typical ratios described above would be only 8 acres of riparian habitat  
27 restored, 8 acres protected, and 360 acres of grassland protected.

28 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.  
29 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats  
30 and species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
31 Appendix 3.C, *Avoidance and Minimization Measures*.

### 32 ***Late Long-Term Timeframe***

33 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
34 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1A a  
35 whole would result in permanent and temporary effects combined on 105 acres of modeled riparian  
36 habitat and 244 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and CZ 8.  
37 Habitat lost in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species. Habitat  
38 would also be lost in areas in CZ 7 that provide high-value habitat for the species.

39 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
40 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
41 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to  
42 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or  
43 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist

1 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800  
2 acres to be conserved would consist of early successional riparian vegetation suitable for riparian  
3 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy  
4 area of protected and restored riparian natural community than what currently exists in CZ 7 and  
5 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific  
6 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at  
7 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological  
8 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal  
9 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines  
10 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from  
11 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators  
12 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

13 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP  
14 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
15 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
16 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
17 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
18 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
19 on the landward side of levees adjacent to restored floodplain would be restored or protected as  
20 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

21 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
22 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to  
23 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
24 flooded areas would provide refuge for the riparian brush rabbit during most years. The Plan would  
25 also create and maintain mounds, levee sections, or other high areas in restored and protected  
26 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the  
27 riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*  
28 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush  
29 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that  
30 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

31 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
32 and protection actions discussed above, as well as the restoration of valley/foothill riparian and  
33 grassland that could overlap with the species model, would result in the restoration of 800 acres of  
34 riparian and 79 acres of grassland modeled habitat for riparian brush rabbit. In addition, protection  
35 of valley/foothill riparian and grassland could overlap with the species model and would result in  
36 the protection of 200 acres of riparian and 317 acres of grassland riparian brush rabbit modeled  
37 habitat.

38 Only a small proportion of the habitat losses would be considered occupied and of high value.  
39 Alternative 1A conservation measures provide for large acreages of riparian brush rabbit riparian  
40 and grassland habitat to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,  
41 AMM25, and AMM37, which are directed at minimizing or avoiding potential impacts during  
42 construction and operation of the conservation measures. Overall, Alternative 1A would provide a  
43 substantial net benefit to the riparian brush rabbit through the increase in available habitat and  
44 habitat in protected status.



1 Considering the habitat restoration and protection associated with CM3, CM7, CM8, and CM11,  
2 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,  
3 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality  
4 of riparian brush rabbit as a result of implementing Alternative 1A would not represent a  
5 substantial adverse effect through habitat modifications and would not substantially reduce the  
6 number or restrict the range of the species. The loss of habitat and potential mortality of riparian  
7 brush rabbits would be a less-than-significant impact under CEQA.

#### 8 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

9 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
10 modeled riparian brush rabbit riparian habitat and of associated grassland habitat. These  
11 construction activities would include water conveyance (including transmission line) construction  
12 in CZ 8, tidal natural communities restoration construction, and construction of setback levees.  
13 Water conveyance construction would potentially affect acres of adjacent riparian habitat and of  
14 associated grassland habitat: this construction would occur in CZ 8 where there is suitable habitat  
15 for the species but surveys by ESRP did not indicate the species is present in this area;; therefore,  
16 the potential for adverse noise and visual effects from conveyance facility construction would be  
17 minimal. Tidal natural communities restoration construction would also potentially affect adjacent  
18 riparian habitat and associated grassland habitat for this species: however, adverse effects on the  
19 species are unlikely because tidal natural communities restoration projects would be sited to avoid  
20 areas occupied by riparian brush rabbit. The activity most likely to result in noise and visual  
21 disturbance to riparian brush rabbit is the construction of setback levees for floodplain restoration,  
22 which would take place in CZ 7, where the species is known to occur. The use of mechanical  
23 equipment during construction might cause the accidental release of petroleum or other  
24 contaminants that would affect the riparian brush rabbit in adjacent habitat, if the species is present.

25 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative  
26 1A would avoid the potential for substantial adverse effects on riparian brush rabbits, either  
27 indirectly or through habitat modifications or result in a substantial reduction in numbers or a  
28 restriction in the range of riparian brush rabbits. Therefore, indirect effects of Alternative 1A would  
29 not have an adverse effect on riparian brush rabbit.

30 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
31 as construction-related noise and visual disturbances could affect riparian brush rabbit in riparian  
32 and grassland habitats. The use of mechanical equipment during construction could cause the  
33 accidental release of petroleum or other contaminants that could affect riparian brush rabbit. The  
34 inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat could  
35 also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10, AMM25,  
36 and AMM37 as part of Alternative 1A, the BDCP would avoid the potential for substantial adverse  
37 effects on riparian brush rabbits, either indirectly or through habitat modifications and would not  
38 result in a substantial reduction in numbers or a restriction in the range of riparian brush rabbits.  
39 Indirect effects of Alternative 1A would have a less-than-significant impact on riparian brush rabbit.

#### 40 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of** 41 **Implementation of Conservation Components**

42 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in  
43 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate

1 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres  
2 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the  
3 riparian brush rabbit. The area between existing levees that would be breached and the newly  
4 constructed setback levees would be inundated through seasonal flooding. The potentially  
5 inundated areas consist of high-value habitat for the species: although they consist of small patches  
6 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous  
7 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would  
8 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to  
9 higher elevation areas that flood infrequently (e.g., every 10 years or more).

10 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian  
11 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of  
12 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that  
13 would be seasonally flooded based on the hypothetical restoration footprint.

14 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of  
15 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic  
16 inundation on the riparian brush rabbit would be minimized through construction and maintenance  
17 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing  
18 Alternative 1A, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not expected to result  
19 in substantial adverse effects on riparian brush rabbit, either directly or through habitat  
20 modifications and would not result in a substantial reduction in numbers or a restriction in the  
21 range of riparian brush rabbits. Therefore, Alternative 1A would not adversely affect the species.

22 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small  
23 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of  
24 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,  
25 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
26 flooding promotes the germination and establishment of many native riparian plants. In the late  
27 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to  
28 the establishment of high-value habitat for covered riparian species, such as the riparian brush  
29 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the  
30 edges of seasonally inundated habitat.

31 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through  
32 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.  
33 Therefore, implementing Alternative 1A, including AMM1–AMM7, AMM10, AMM25, and AMM37,  
34 would not be expected to result in substantial adverse effects on riparian brush rabbit, either  
35 directly or through habitat modifications and would not result in a substantial reduction in numbers  
36 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland  
37 habitat for riparian brush rabbit under Alternative 1A would have a less-than-significant impact on  
38 the species.

### 39 **Riparian Woodrat**

40 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances  
41 from the valley/foothill riparian natural community, geographically constrained to the south Delta  
42 portion of the BDCP area in CZ 7, south of State Route 4 and Old River Pipeline along the Stanislaus,  
43 San Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise  
44 Cut, Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded

1 from the riparian woodrat habitat model due to a lack of trees or riparian corridors that were too  
2 narrow. Factors considered in assessing the value of affected habitat for the riparian woodrat, to the  
3 extent that information is available, include habitat patch size and connectivity.

4 The riparian woodrat is not known to occur in the study area. The only verified extant population of  
5 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell  
6 Memorial State Park along the Stanislaus River (Williams 1986:1–112; 1993). Riparian woodrat may  
7 occur in small patches of valley oak riparian forest along the San Joaquin River from the southern tip  
8 of the study area north to approximately the Interstate 5 overcrossing near Lathrop (Figure 12-47).  
9 Construction and restoration associated with Alternative 1A conservation measures would result in  
10 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-  
11 1A-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural  
12 communities could affect modeled riparian woodrat habitat. However, because the species is not  
13 known to occur in the study area it is not expected to be affected by BDCP actions unless the species  
14 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 1A  
15 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat  
16 (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the riparian woodrat  
17 involves providing opportunities for population expansion into the Plan Area from adjacent lands to  
18 the south and southeast. The strategy focuses on restoring and maintaining suitable habitat at the  
19 southernmost end of CZ 7, providing connectivity with existing populations to the south and  
20 southeast, and creating and maintaining flood refugia. This conservation approach is consistent with  
21 the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles (BDCP Appendix  
22 3.E). The conservation measures that would be implemented to achieve the biological goals and  
23 objectives are summarized below.

- 24 ● Provide a range of elevations in restored floodplains that transition from frequently flooded  
25 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
26 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
27 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 28 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
29 between existing conservation lands (Objective L1.6, associated with CM3).
- 30 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
31 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
32 associated with CM3-CM8, and CM11).
- 33 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres  
34 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with  
35 CM3 and CM7).
- 36 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
37 (Objective VFRNC1.2, associated with CM3).
- 38 ● Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
39 overlap among vegetation components and over adjacent riverine channels, freshwater  
40 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 41 ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
42 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the  
43 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak

overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).

- Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored under Objective RW1.1 through the retention, construction, and/or restoration of high-ground habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective RW1.2, associated with CM7 and CM11).

As explained below, with the restoration and protection of these amounts of habitat, in addition to the AMMs to reduce potential effects, impacts on riparian woodrat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1A-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	0	51	0	33	0	203
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>51</b>	<b>0</b>	<b>33</b>	<b>0</b>	<b>203</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>51</b>	<b>0</b>	<b>33</b>	<b>0</b>	<b>203</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

- Alternative 1A conservation measures would result in the permanent loss of up to 51 acres of habitat and temporary loss of up to 33 acres of modeled habitat for riparian woodrat (Table 12-4-56). There are no riparian woodrat occurrences that overlap with the Plan footprint. Construction of Alternative 1A water conveyance facilities (CM1) would not affect modeled riparian woodrat habitat; however, tidal natural communities restoration (CM4) and seasonally inundated floodplain restoration (CM5) would remove habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.
- *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and inundation would permanently remove approximately 10 acres of modeled habitat for the riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch surrounded by agricultural lands, and the species has a relatively low likelihood of being present

1 in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*  
2 require that tidal natural communities restoration avoid removal of any habitat occupied by the  
3 riparian woodrat as determined by presence/absence surveys. Because the estimates of habitat  
4 loss due to tidal inundation are based on projections of where restoration may occur, actual  
5 habitat loss is expected to be lower because sites would be selected to minimize effects on  
6 riparian woodrat.

- 7 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
8 restoration would result in the permanent removal of approximately 41 acres of modeled  
9 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is  
10 moderate. Although the habitat consists of small patches and narrow bands of riparian  
11 vegetation and no riparian woodrats have been detected in CZ 7, the riparian patches are in proximity  
12 to each other along the San Joaquin River. There are two species occurrences immediately south  
13 of CZ 7, one of which is less than 1.5 mile from the southernmost patch of riparian habitat  
14 potentially affected by levee construction.

15 The final floodplain restoration design would differ from the hypothetical footprint used for this  
16 effects analysis. However, monitoring and adaptive management described in *CM11 Natural*  
17 *Communities Enhancement and Management*, and AMM25 would ensure that riparian woodrat  
18 habitat permanently removed does not exceed the amount estimated based on the hypothetical  
19 footprint. Habitat loss is expected to be lower than 41 acres because sites would be selected and  
20 restoration designed to minimize effects on the riparian woodrat. If natural flooding is  
21 insufficient to maintain appropriate riparian woodrat vegetation structure, the vegetation  
22 would be actively managed to provide suitable habitat structure as described in *CM11 Natural*  
23 *Communities Enhancement and Management*.

24 Levee construction would also result in the temporary removal of 33 acres of modeled habitat  
25 for the riparian woodrat. Although the effects are considered temporary, 5 years to several  
26 decades may be required for ecological succession to occur and for restored riparian habitat to  
27 replace the function of habitat that has been affected.

- 28 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
29 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
30 habitats may result in localized ground disturbances that could temporarily remove small  
31 amounts of riparian woodrat habitat. Enhancement and management actions in riparian  
32 woodrat habitat within the reserve system may include invasive plant removal, planting and  
33 maintaining vegetation to improve and sustain habitat characteristics for the species, and  
34 creating and maintaining flood refugia. These activities are expected to have minor adverse  
35 effects on available riparian woodrat habitat and are expected to result in overall improvements  
36 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects  
37 cannot be quantified, but are expected to be minimal and would be avoided and minimized  
38 through the AMMs listed below
- 39 • *Operations and maintenance*: The only ongoing effects on the riparian woodrat are those  
40 potentially resulting from habitat enhancement and management activities. Enhancement and  
41 management actions in riparian brush rabbit habitat within the reserve system may include  
42 invasive plant removal, planting and maintaining vegetation to improve and sustain habitat  
43 characteristics for the species, and creating and maintaining flood refugia. These activities may  
44 result in harassment of riparian woodrats through noise and visual disturbance which would be  
45 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.

- 1       • Injury and direct mortality: Construction vehicle activity is not likely to result in injury or  
2 mortality of individual riparian woodrats because the species is not likely to be present in the  
3 areas that would be affected by this activity, based on live trapping results (BDCP Appendix 3.E,  
4 *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal natural  
5 communities restoration would not result in injury or mortality of the riparian woodrats  
6 because tidal natural communities restoration projects would be designed to avoid occupied  
7 riparian woodrat habitat and if that is not possible to trap and relocate the species (AMM25).  
8 Activities associated with construction of setback levees for floodplain restoration could result  
9 in injury or mortality of riparian woodrats: however, preconstruction surveys, construction  
10 monitoring, and other measures would be implemented under AMM25 to avoid and minimize  
11 injury or mortality of this species during construction, as described in BDCP Appendix 3.C. If  
12 occupied riparian woodrat habitat cannot be avoided, mortality would be avoided through  
13 implementation of a trapping and relocation program. The program would be developed in  
14 coordination with USFWS, and relocation would be to a site approved by USFWS prior to  
15 construction activities.

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

#### 19       ***Near-Term Timeframe***

20       Because water conveyance facilities construction is being evaluated at the project level, the near-  
21 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
22 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
23 not be adverse under NEPA.

24       No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11  
25 could have minor adverse effects on available riparian woodrat habitat, and activities associated  
26 with construction of setback levees for floodplain restoration could result in injury or mortality of  
27 riparian woodrats.

28       The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1) and  
29 protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition, the  
30 species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term  
31 protection and restoration efforts. The natural community restoration and protection activities are  
32 expected to be concluded during the first 10 years of Plan implementation, which is close enough in  
33 time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These  
34 commitments are more than sufficient to support the conclusion that the near-term effects of  
35 Alternative 1A would be not be adverse under NEPA, because no riparian woodrat habitat would be  
36 lost and there is only limited potential for minor adverse effects on woodrats or its habitat from  
37 implementation of CM11.

38       These effects cannot be quantified, but are expected to be minimal and would be avoided and  
39 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training, AMM2*  
40 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
41 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged*  
43 *Material, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*

1 *Communities, and AMM25 Riparian Woodrat and Riparian Brush Rabbit.* The AMMs are described in  
2 detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures.*

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

4 The habitat model indicates that the study area supports approximately 2,166 acres of riparian  
5 woodrat habitat. Alternative 1A as a whole would result in the permanent loss of and temporary  
6 removal of 84 acres of modeled habitat for riparian woodrat habitat during the late long-term. This  
7 represents 2% of the riparian modeled habitat in the study area. None of this habitat is considered  
8 occupied.

9 Alternative 1A would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
10 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
11 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian  
12 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow  
13 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing  
14 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be  
15 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural  
16 community than what currently exists in CZ 7 and would be contiguous with existing modeled  
17 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of  
18 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,  
19 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural  
20 community would provide riparian woodrat habitat proportional to the amount of modeled habitat  
21 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area  
22 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community  
23 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is  
24 comparable to or of higher value than existing modeled grassland habitat. All riparian protection  
25 would occur during the near-term period, to offset early riparian losses.

26 Alternative 1A would also create and maintain mounds, levee sections, or other high areas in  
27 restored and protected riparian areas (Objective RW1.2) that are designed specifically to provide  
28 flood refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian*  
29 *Brush Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from  
30 areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10  
31 years or more) (Objective L1.5): these infrequently flooded areas would provide refuge for the  
32 riparian woodrat during most years.

33 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
34 and protection actions discussed above, as well as the restoration of valley/foothill riparian that  
35 could overlap with the species model, would result in the restoration of 300 acres of modeled  
36 habitat for riparian woodrat. In addition, protection of valley/foothill riparian could overlap with  
37 the species model and would result in the protection of 90 acres riparian woodrat modeled habitat.

38 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
39 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
40 opportunities for northward expansion of the species into the study area Implementation of  
41 Alternative 1A conservation measures is not expected to adversely affect the riparian woodrat for  
42 the following reasons.

- 43 ● There are no riparian woodrat occurrences in the Plan Area.

- 1 • The habitat that would be removed consists of small patches that are of moderate value for the  
2 species.
- 3 • The habitat that would be removed permanently is a small proportion of the total habitat in the  
4 Plan Area (2%).
- 5 • Avoidance and minimization measures would be implemented to avoid injury or mortality of  
6 riparian woodrats, and to minimize loss of occupied habitat.
- 7 • Floodplain restoration would be designed to provide flood refugia so that flooding would not  
8 adversely affect any riparian woodrats that occupy restored floodplains.

9 **NEPA Effects:** Alternative 1A would provide a substantial benefit to the riparian woodrat through  
10 the net increase in available habitat and a net increase of habitat in protected status. These  
11 protected areas would be managed and monitored to support the species. The affected habitat is  
12 currently unoccupied and habitat removal is not expected to result in a discernible change in the  
13 abundance or distribution of riparian woodrat should they occupy study area habitats. Should the  
14 species be detected in the study area, AMM1–AMM7, AMM10, and AMM25 would avoid and  
15 minimize the effects of conservation component construction and implementation. Therefore, the  
16 loss of habitat and potential mortality of individuals would not have an adverse effect on riparian  
17 woodrat.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Because water conveyance facilities construction is being evaluated at the project level, the near-  
21 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
22 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
23 be less than significant for CEQA purposes.

24 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11  
25 could have minor adverse effects on available riparian woodrat habitat, and activities associated  
26 with construction of setback levees for floodplain restoration could result in injury or mortality of  
27 riparian woodrats.

28 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1) and  
29 protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition, the  
30 species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term  
31 protection and restoration efforts. The natural community restoration and protection activities are  
32 expected to be concluded during the first 10 years of Plan implementation, which is close enough in  
33 time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes. The Plan  
34 also contains commitments to implement AMM1-AMM7, AMM10, and AMM25, which include  
35 elements that avoid or minimize the risk of affected habitats and species adjacent to work areas. The  
36 AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

37 These commitments are more than sufficient to support the conclusion that the near-term effects of  
38 Alternative 1A would be less than significant under CEQA, because no riparian woodrat habitat  
39 would be lost and there is only limited potential for minor adverse effects on woodrats or its habitat  
40 from implementation of CM11.



1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 2,166 acres of riparian  
3 woodrat habitat. Alternative 1A as a whole would result in the permanent loss and temporary  
4 removal of 84 acres of modeled habitat for riparian woodrat habitat during the late long-term. This  
5 represents 2% of the riparian modeled habitat in the study area. None of this habitat is considered  
6 occupied.

7 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
8 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
9 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian  
10 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow  
11 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing  
12 occupied or potentially occupied habitat to be restored in C Z7. The conserved habitat would also be  
13 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural  
14 community than what currently exists in C Z7 and would be contiguous with existing modeled  
15 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of  
16 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,  
17 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural  
18 community would provide riparian woodrat habitat proportional to the amount of modeled habitat  
19 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area  
20 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community  
21 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is  
22 comparable to or of higher value than existing modeled grassland habitat. All riparian protection  
23 would occur during the near-term period, to offset early riparian losses.

24 Alternative 1A would also create and maintain mounds, levee sections, or other high areas in  
25 restored and protected riparian areas (Objective RW1.2) that are designed specifically to provide  
26 flood refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian  
27 Brush Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from  
28 areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10  
29 years or more) (Objective L1.5): these infrequently flooded areas would provide refuge for the  
30 riparian woodrat during most years.

31 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
32 and protection actions discussed above, as well as the restoration of valley/foothill riparian that  
33 could overlap with the species model, would result in the restoration of 300 acres of modeled  
34 habitat for riparian woodrat. In addition, protection of valley/foothill riparian could overlap with  
35 the species model and would result in the protection of 90 acres riparian woodrat modeled habitat.

36 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
37 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
38 opportunities for northward expansion of the species into the study area Implementation of  
39 Alternative 1A conservation measures is not expected to adversely affect the riparian woodrat for  
40 the following reasons.

- 41
- 42 • There are no riparian woodrat occurrences in the Plan Area.
  - 43 • The habitat that would be removed consists of small patches that are of moderate value for the species.

- 1 • The habitat that would be removed permanently is a small proportion of the total habitat in the  
2 Plan Area (2%).
- 3 • Avoidance and minimization measures would be implemented to avoid injury or mortality of  
4 riparian woodrats, and to minimize loss of occupied habitat.
- 5 • Floodplain restoration would be designed to provide flood refugia so that flooding would not  
6 adversely affect any riparian woodrats that occupy restored floodplains.

7 Alternative 1A would provide a substantial benefit to the riparian woodrat through the net increase  
8 in available habitat and a net increase of habitat in protected status. These protected areas would be  
9 managed and monitored to support the species. The affected habitat is currently unoccupied and  
10 habitat removal is not expected to result in a discernible change in the abundance or distribution of  
11 riparian woodrat. Should the species be detected in the study area, implementation of AMM1–  
12 AMM7, AMM10, and AMM25 would avoid and minimize the effects of conservation component  
13 construction and implementation. Therefore, the loss of habitat and potential mortality of  
14 individuals would not have a significant impact on riparian woodrat.

### 15 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

16 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
17 modeled habitat for riparian woodrat. These effects are related to construction activities associated  
18 with tidal natural communities restoration (CM4) and construction of setback levees (CM5). Indirect  
19 effects on the species from construction associated with tidal natural communities restoration are  
20 unlikely because tidal natural communities restoration projects would be sited to avoid areas  
21 occupied by riparian woodrat (AMM25). The activity most likely to result in noise and visual  
22 disturbance to riparian woodrat is the construction of setback levees. These adverse effects would  
23 be minimized through implementation of AMM1–AMM7, AMM10, and AMM25.

24 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1A  
25 would avoid the potential for substantial effects on riparian woodrats, either indirectly or through  
26 habitat modifications, or result in a substantial reduction in numbers or a restriction in the range of  
27 riparian woodrats. Therefore, indirect effects of Alternative 1A would not have an adverse effect on  
28 riparian woodrat.

29 **CEQA Conclusion:** Should riparian woodrat be detected in the study area, indirect effects of  
30 conservation measure construction and implementation could impact this species and its habitat.  
31 AMM1–AMM7, AMM10, and AMM25 implemented under Alternative 1A would avoid and minimize  
32 the impact and result in a less-than-significant impact.

### 33 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of** 34 **Implementation of Conservation Components**

35 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in  
36 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic  
37 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the  
38 Plan Area). The area between existing levees that would be breached and the newly constructed  
39 setback levees would be inundated through seasonal flooding. The potentially inundated areas  
40 consist of moderate-value habitat for the species. Although the habitat consists of small patches and  
41 narrow bands of riparian vegetation and no riparian woodrats have been detected in CZ 7, the  
42 riparian patches are in proximity to each other along the San Joaquin River and there are two

1 species occurrences immediately south of CZ 7, one of which is less than 1 mile from the  
2 southernmost patch of riparian habitat potentially affected by levee construction. The restored  
3 floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that  
4 flood infrequently (e.g., every 10 years or more).

5 **NEPA Effects:** Alternative 1A's periodic inundation of 203 acres of riparian habitat for riparian  
6 woodrat is not expected to result in substantial adverse effects on riparian woodrat, either directly  
7 or through habitat modifications and would not result in a substantial reduction in numbers or a  
8 restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian  
9 woodrat would be minimized through construction and maintenance of flood refugia to allow  
10 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat  
11 habitat would not adversely affect the species.

12 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of  
13 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian  
14 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would  
15 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to  
16 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result  
17 in significant impacts on riparian woodrat, either directly or through habitat modifications, and  
18 would not result in a substantial reduction in numbers or a restriction in the range of riparian  
19 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 1A would have a less-  
20 than-significant impact.

### 21 **Salt Marsh Harvest Mouse**

22 The habitat model used to assess effects on the salt marsh harvest mouse includes six habitat types:  
23 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat  
24 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within  
25 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within  
26 managed wetland boundaries. The tidal and managed wetland habitats were discriminated  
27 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic  
28 flooding and have lower long-term conservation value than tidal wetlands.

29 Construction and restoration associated with Alternative 1A conservation measures would result in  
30 effects to modeled salt marsh harvest mouse habitat, which would include permanent losses and  
31 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species  
32 postrestoration) as indicated in Table 12-1A-57. All of the effects to the species would take place  
33 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
34 Alternative 1A would also include the following conservation actions over the term of the BDCP to  
35 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 36 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
37 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
38 (Objective TBEWNC1.1, associated with CM4)
- 39 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
40 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to  
41 total (existing and restored) acreage targets for each complex as specified in the final Recovery  
42 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,  
43 associated with CM4).

- 1 • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
2 natural community within the reserve system (Objective TBEWNC2.1).
- 3 • Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex  
4 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 5 • Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide  
6 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective  
7 GNC1.4, associated with CM3 and CM8).
- 8 • Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or  
9 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems  
10 of Northern and Central California (Objective SMHM1.1).
- 11 • Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed  
12 wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final  
13 Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase  
14 population levels above the current baseline (Objective SMHM1.2).

15 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
16 AMMs to minimize potential effects, impacts on the salt marsh harvest mouse would not be adverse  
17 for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with**  
2 **Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	TBEW Primary	64	67	0	0	0	0
	TBEW Secondary	0	0	0	0	0	0
	Upland Secondary	8	9	0	0	0	0
	MW Wetland Primary	1,913	5,323	0	0	0	0
	MW Wetland Secondary	315	807	0	0	0	0
	MW Upland	165	762	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>2,465</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>2,645</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

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

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

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

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

TBEW = tidal brackish emergent wetland

MW = managed wetland

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**  
5 **Mouse**

6 Alternative 1A tidal restoration (CM4) would be the only conservation measure resulting in effects  
7 on salt marsh harvest mouse habitat. Habitat enhancement and management activities (CM11),  
8 which include ground disturbance or removal of nonnative vegetation, could result in local adverse  
9 habitat effects. Each of these activities is described in detail below. A summary statement of the  
10 combined impacts and NEPA and CEQA conclusions follows the individual conservation measure  
11 discussions.

- 12 • *CM4 Tidal Natural Communities Restoration*: would result in effects to 6,968 acres of salt marsh  
13 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592  
14 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas  
15 of converted habitat but these areas would ultimately provide suitable habitat for the species.  
16 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary  
17 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal  
18 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap  
19 with 13 CNDDB records for salt marsh harvest mouse (California Department of Fish and

1 Wildlife 2012nnn); however, the BDCP's conservation actions assume that all suitable habitat in  
2 Suisun Marsh is occupied by the species.

- 3 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
4 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to  
5 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of  
6 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat  
7 management actions included in *CM11 Natural Communities Enhancement and Management* that  
8 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in  
9 localized ground disturbances that could temporarily remove small amounts of salt marsh  
10 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection of  
11 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of  
12 restored salt marsh harvest mouse habitat would also have enhancement and management  
13 actions that would include invasive species control, nonnative wildlife control, and vegetation  
14 management. Ground-disturbing activities, such as removal of nonnative vegetation are  
15 expected to have minor effects on habitat and are expected to result in overall improvements to  
16 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These  
17 effects cannot be quantified, but are expected to be minimal and would be avoided and  
18 minimized by the AMMs listed below.
- 19 • *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or  
20 mortality to salt marsh harvest mouse during restoration, enhancement, and management  
21 activities. However, preconstruction surveys, construction monitoring, and other measures  
22 would be implemented to avoid and minimize injury or mortality of this species during these  
23 activities, as required by the AMMs listed below.

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

### 27 ***Near-Term Timeframe***

28 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
29 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
30 the effects of near-term covered activities would not be adverse under NEPA and would be less than  
31 significant under CEQA. Alternative 1A would effect 2,465 acres of salt marsh harvest mouse  
32 modeled habitat in the study area in the near-term. These effects include 1,517 acres of permanent  
33 loss and 948 acres of converted habitat. Most of the habitat converted would be from primary  
34 habitats (599 acres consisting of 64 acres of tidal brackish emergent wetland and 534 acres of  
35 managed wetland) to secondary tidal brackish emergent wetland.

36 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
37 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
38 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
39 mouse. Though there would be a net loss of modeled habitat, all of these losses (97%) are to  
40 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
41 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
42 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
43 near-term protection and restoration efforts. These Plan goals represent performance standards for  
44 considering the effectiveness of restoration actions. The acres of protection and restoration

1 contained in the near-term Plan goals would keep pace with the loss of habitat and effects to salt  
2 marsh harvest mouse.

3 Other factors relevant to effects on salt marsh harvest mouse include:

- 4 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
5 wetlands as noted in the specie's draft recovery plan because the conversion of managed  
6 wetland to tidal marsh occurs gradually. Tidal marsh restoration is often accomplished by  
7 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
8 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
9 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
10 prolonged period (sometimes a decade or more) in which resident mice populations are  
11 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
12 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
13 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
14 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
15 habitat from a variety of factors, including flooding from levee failure and cessation of active  
16 management (which is often necessary to maintain habitat values in managed wetlands).  
17 Therefore, the temporary effects under BDCP are consistent with those deemed acceptable in  
18 the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 19 • Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of  
20 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural  
21 communities restoration does not adversely affect the salt marsh harvest mouse population,  
22 ensure that short-term population loss is relatively small and incremental, and maintain local  
23 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun  
24 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas  
25 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan  
26 (U.S. Fish and Wildlife Service 2010).
- 27 • The salt marsh harvest mouse population would be monitored during the phasing process (see  
28 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
29 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
30 Section 3.6).
- 31 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
32 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
33 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
34 forage and cover.

35 Because there are no project level impacts to salt marsh harvest mouse from CM1, the analysis of the  
36 effects and conservation actions does not include a comparison to standard ratios used for project  
37 level NEPA analyses.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
41 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
42 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
43 areas. The AMMs are described in detail in BDCP Appendix 3.C.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.  
3 Alternative 1A as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse  
4 modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and  
5 1,592 acres of habitat conversions. These effects (loss and conversion) would be on 20% of the  
6 modeled habitat in the study area. Most of these effects (99%) would be to managed wetlands,  
7 which though are known to be occupied by salt marsh harvest mouse are at high risk of catastrophic  
8 flooding and have a lower long-term conservation value than tidal wetlands (U.S. Fish and Wildlife  
9 Service 2010). Effects on up to 20% of the species' habitat in the Plan Area may diminish the salt  
10 marsh harvest mouse population in the Plan Area and result in reduced genetic diversity, thereby  
11 putting the local population at risk of local extirpation due to random environmental fluctuations or  
12 catastrophic events. This effect is expected to be greatest if large amounts of habitat are removed at  
13 one time in Suisun Marsh and are not effectively restored for many years, and if there are no  
14 adjacent lands with salt marsh harvest mouse populations to recolonize restored areas.

15 The Plan includes a commitment to restore or create 6,000 acres to tidal brackish emergent wetland,  
16 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh  
17 harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4), the protection of 6,500  
18 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh  
19 harvest mouse (SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or  
20 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to  
21 provide upland refugia for salt marsh harvest mouse (GNC1.4, associated with CM3 and CM8). Other  
22 factors relevant to effects on salt marsh harvest mouse are listed below.

- 23 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
24 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the  
25 conversion of managed wetland to tidal marsh occurs gradually. Tidal marsh restoration is often  
26 accomplished by breaching levees and converting diked nontidal marsh currently occupied by  
27 salt marsh harvest mouse to tidal wetlands, their historic condition. Conversion of these  
28 subsided areas requires sedimentation and accretion over time to restore marsh plains,  
29 resulting in a prolonged period (sometimes a decade or more) in which resident mice  
30 populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010).  
31 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan  
32 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.  
33 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
34 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and  
35 cessation of active management (which is often necessary to maintain habitat values in managed  
36 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
37 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 38 • In order to ensure that temporal loss as a result of tidal natural communities restoration does  
39 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
40 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
41 that short-term population loss is relatively small and incremental, and maintain local source  
42 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
43 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
44 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
45 and Wildlife Service 2010).



- 1     • The salt marsh harvest mouse population would be monitored during the phasing process (see  
2       BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
3       maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
4       Section 3.6).
- 5     • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
6       than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
7       pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
8       forage and cover.
- 9     • The habitat that would be restored and protected would consist of large blocks of contiguous  
10      tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
11      vegetation suitable for the species. This would provide greater habitat connectivity and greater  
12      habitat value, which is expected to accommodate larger populations and to therefore increase  
13      population resilience to random environmental events and climate change.

14     The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
15     and protection actions discussed above could result in the restoration of 6,046 acres and the  
16     protection of 1,550 acres of modeled habitat for salt marsh harvest mouse.

17     **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse  
18     habitat from Alternative 1A would represent an adverse effect as a result of habitat modification and  
19     potential direct mortality of a special-status species. However, the BDCP has committed to habitat  
20     protection, restoration, management, and enhancement associated with CM3, CM4, CM8 and CM11.  
21     This habitat protection, restoration, management, and enhancement would be guided by species-  
22     specific goals and objectives and by AMM1–AMM5 and AMM26, which would be in place throughout  
23     the construction period. Considering these commitments, losses and conversions of salt marsh  
24     harvest mouse habitat and potential mortality of individuals in both the near-term and late long-  
25     term under Alternative 1A would not be an adverse effect.

## 26     **CEQA Conclusion:**

### 27     **Near-Term Timeframe**

28     The near-term BDCP conservation strategy has been evaluated to determine whether it would  
29     provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
30     the impacts of near-term covered activities would be less than significant under CEQA. Alternative  
31     1A would impacts 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the  
32     near-term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat.  
33     Most of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal  
34     brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish  
35     emergent wetland.

36     The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
37     wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
38     and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
39     mouse). Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to  
40     managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
41     catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
42     value than tidal wetlands. The species-specific biological goals and objectives would inform the  
43     near-term protection and restoration efforts. These Plan goals represent performance standards for

1 considering the effectiveness of restoration actions. The acres of protection and restoration  
2 contained in the near-term Plan goals would keep pace with the loss of habitat and effects to salt  
3 marsh harvest mouse habitat.

4 Other factors relevant to effects on salt marsh harvest mouse include:

- 5 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
6 wetlands as noted in the specie's draft recovery plan because the conversion of managed  
7 wetland to tidal marsh occurs gradually. Tidal marsh restoration is often accomplished by  
8 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
9 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
10 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
11 prolonged period (sometimes a decade or more) in which resident mice populations are  
12 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
13 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
14 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
15 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
16 habitat from a variety of factors, including flooding from levee failure and cessation of active  
17 management (which is often necessary to maintain habitat values in managed wetlands).  
18 Therefore, the temporary effects under BDCP are consistent with those deemed acceptable in  
19 the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 20 • In order to ensure that temporal loss as a result of tidal natural communities restoration does  
21 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
22 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
23 that short-term population loss is relatively small and incremental, and maintain local source  
24 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
25 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
26 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
27 and Wildlife Service 2010).
- 28 • The salt marsh harvest mouse population would be monitored during the phasing process (see  
29 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
30 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
31 Section 3.6).
- 32 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
33 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
34 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
35 forage and cover.

36 Because there are no project level impacts to salt marsh harvest mouse from CM1, the analysis of the  
37 effects and conservation actions does not include a comparison to standard ratios used for project  
38 level CEQA analyses.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
42 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
43 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
44 areas. The AMMs are described in detail in BDCP Appendix 3.C.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.  
3 Alternative 1A as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse  
4 modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and  
5 1,592 acres of habitat conversions. The Plan contains a commitment to restore or create 6,000 acres  
6 of tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh  
7 habitat (primary habitat for salt marsh harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1,  
8 associate with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of which would  
9 be specifically managed for salt marsh harvest mouse (SMHM1.2 and MWNC1.1, associated with  
10 CM3), and the protection and/or restoration of grassland adjacent to tidal restoration (areas within  
11 200 feet of tidal restoration) to provide upland refugia for salt marsh harvest mouse (GNC1.4,  
12 associated with CM3 and CM8). Other factors relevant to effects on salt marsh harvest mouse are  
13 listed here.

- 14 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
15 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the  
16 conversion of managed wetland to tidal marsh occurs gradually. Tidal marsh restoration is often  
17 accomplished by breaching levees and converting diked nontidal marsh currently occupied by  
18 salt marsh harvest mouse populations to tidal wetlands, their historic condition. Conversion of  
19 these subsided areas requires sedimentation and accretion over time to restore marsh plains,  
20 resulting in a prolonged period (sometimes a decade or more) in which resident mice  
21 populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010).  
22 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan  
23 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.  
24 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
25 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and  
26 cessation of active management (which is often necessary to maintain habitat values in managed  
27 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
28 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 29 • In order to ensure that temporal loss as a result of tidal natural communities restoration does  
30 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
31 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
32 that short-term population loss is relatively small and incremental, and maintain local source  
33 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
34 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
35 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
36 and Wildlife Service 2010).
- 37 • The salt marsh harvest mouse population would be monitored during the phasing process (see  
38 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
39 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
40 Section 3.6).
- 41 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
42 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
43 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
44 forage and cover.

- The habitat that would be restored and protected would consist of large blocks of contiguous tidal brackish emergent wetland that has a large proportion of pickleweed-dominated vegetation suitable for the species. This would provide greater habitat connectivity and greater habitat, which is expected to accommodate larger populations and to therefore increase population resilience to random environmental events and climate change.

The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration and protection actions discussed above could result in the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh harvest mouse.

Alternative 1A would result in substantial habitat modifications to salt marsh harvest mouse habitat in the absence of other conservation actions. However, with habitat protection, restoration, management, and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and objectives and by AMM1-AMM5 and AMM26, which would be in place throughout the construction period, Alternative 1A over the term of the BDCP would not result in a substantial adverse effect through habitat modifications and would not substantially reduce the number or restrict the range of the species. Therefore, the alternative would have a less-than-significant impact on salt marsh harvest mouse.

#### **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8), and management and enhancement activities (CM11) could result in temporary noise and visual disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of the BDCP. These potential effects would be minimized or avoided through AMM1-AMM6, and AMM26, which would be in effect throughout the term of the Plan.

The use of mechanical equipment during the implementation of the conservation measures could cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on the species and its habitat. AMM1-AMM5 would minimize the likelihood of such spills and would ensure measures are in place to prevent runoff from the construction area and potential effects of sediment on salt marsh harvest mouse.

Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to mercury. Mercury is transformed into the more bioavailable form of methylmercury under anaerobic conditions, which in the environment typically occurs in sediments subjected to regular wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of mercury. In general, the highest methylation rates are associated with high tidal marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al. 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay showed an absence of salt marsh harvest mouse where mercury concentrations measured in house mice (*Mus musculus*) livers were  $\geq 0.19$   $\mu\text{g/g}$  (dry weight) (Clark et al. 1992). Clark et al (1992) also

1 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected  
2 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh  
3 harvest mouse at certain locations may be associated with higher amounts of mercury and  
4 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt  
5 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants  
6 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown  
7 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh  
8 harvest mouse.

9 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
10 under the plan would generate less methylmercury than the existing managed wetlands. The  
11 potential for salt marsh harvest mouse exposure to methylmercury in Suisun Marsh may decrease in  
12 the long term because the creation of tidal brackish emergent wetland would predominantly result  
13 from the conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions  
14 for project-specific Mercury Management Plans. Along with avoidance and minimization measures  
15 and adaptive management and monitoring, CM12 could reduce the effects of methylmercury on salt  
16 marsh harvest mouse resulting from BDCP tidal restoration.

17 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative  
18 1A would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also  
19 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,  
20 or restrict the species' range. Therefore, the indirect effects of Alternative 1A would not have an  
21 adverse effect on salt marsh harvest mouse.

22 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
23 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical  
24 equipment during construction could cause the accidental release of petroleum or other  
25 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge  
26 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With  
27 implementation of AMM1-AMM5, and AMM26 as part of Alternative 1A construction, operation and  
28 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh  
29 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result  
30 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The  
31 indirect effects of Alternative 1A would have a less-than-significant impact on salt marsh harvest  
32 mouse.

33 Salt marsh harvest mouse could experience indirect effects from increased exposure to  
34 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the  
35 potential indirect effects of methylmercury would not result in a substantial reduction in numbers  
36 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-  
37 significant impact on the species.

### 38 **Suisun Shrew**

39 Primary Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and  
40 certain *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by  
41 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal  
42 wetland edge were classified separately as secondary habitat because they are used seasonally  
43 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.  
44 Construction and restoration associated with Alternative 1A conservation measures would result in

1 effects to modeled Suisun shrew habitat, which would include permanent losses and habitat  
2 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species  
3 postrestoration) as indicated in Table 12-1A-58. All of the effects on the species would take place  
4 over an extended period of time as tidal marsh is restored in the Plan Area.

5 Full implementation of Alternative 1A would also include the following conservation actions over  
6 the term of the BDCP to benefit Suisun shrew (BDCP Chapter 3, *Conservation Strategy*).

- 7 • Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
8 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
9 (TBEWNC1.1, associated with CM4)
- 10 • Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
11 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing  
12 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal  
13 Marsh Ecosystems of Northern and Central California (TBEWNC1.2, associated with CM4).
- 14 • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
15 natural community within the reserve system (TBEWNC2.1).
- 16 • Protect or restore grasslands adjacent t restored tidal brackish emergent wetlands to provide at  
17 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which  
18 provides refugia during high tides (GNC1.4, associated with CM3 and CM8).

19 As explained below, with the restoration or protection of these amounts of habitat, impacts on the  
20 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA  
21 Alternative 1A.

22 **Table 12-1A-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 1A (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	<i>Primary</i>	58	60	0	0	0	0
	<i>Secondary</i>	47	342	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun Shrew**

2 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to  
3 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground  
4 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of  
5 these activities is described in detail below. A summary statement of the combined impacts and  
6 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 7 • *CM4 Tidal Natural Communities Restoration*: would result in effects on 401 acres of Suisun shrew  
8 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat  
9 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but  
10 would ultimately provide suitable habitat for the species. However, all 24 acres would be  
11 converted from secondary to primary habitat and therefore over would be net benefit to the  
12 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun  
13 shrew (California Department of Fish and Wildlife 2012ppp).
- 14 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
15 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to  
16 provide habitat for covered species, including Suisun shrew. A variety of habitat management  
17 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
18 to enhance and manage these areas may result in localized ground disturbances that could  
19 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would  
20 be protected and/or restored within 200 feet of restored tidal marsh would also have  
21 enhancement and management actions that would include invasive species control, nonnative  
22 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of  
23 nonnative vegetation are expected to have minor effects on habitat and are expected to result in  
24 overall improvements to and maintenance of Suisun shrew habitat values over the term of the  
25 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
26 and minimized by the AMMs listed below.
- 27 • *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or  
28 mortality to Suisun shrew during restoration, enhancement, and management activities.  
29 However, preconstruction surveys, construction monitoring, and other measures would be  
30 implemented to avoid and minimize injury or mortality of this species during these activities, as  
31 required by the AMM listed below.

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

35 ***Near-Term Timeframe***

36 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
37 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
38 effects of near-term covered activities would not be adverse under NEPA and would be less than  
39 significant under CEQA. Alternative 1A would effect 105 acres of Suisun shrew modeled habitat in  
40 the study area in the near-term. These effects include 90 acres of permanent loss and 15 acres of  
41 converted habitat, which is all secondary habitat being converted to primary habitat.

42 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
43 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal

1 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals  
2 represent performance standards for considering the effectiveness of restoration actions. The acres  
3 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
4 term Plan goals would keep pace with the loss of habitat and effects to Suisun shrew.

5 Other factors relevant to effects on Suisun shrew include:

- 6 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
7 loss of habitat and habitat fragmentation
- 8 • The habitat that would be restored and protected would consist of large blocks of contiguous  
9 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
10 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
11 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
12 increase population resilience to random environmental events and climate change.
- 13 • The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount  
14 permanently lost (105 acres).

15 Because there are no project level impacts to Suisun shrew from CM1, the analysis of the effects and  
16 conservation actions does not include a comparison to standard ratios used for project level NEPA  
17 analyses.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
22 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
23 areas. The AMMs are described in detail in BDCP Appendix 3.C.

#### 24 ***Late Long-Term Timeframe***

25 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 1A  
26 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the  
27 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions  
28 (roughly 5% of the habitat in the study area).

29 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,  
30 1,500 acres of which would target middle and high marsh habitat (primary habitat for Suisun  
31 shrew) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the protection and/or  
32 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration, of  
33 which approximately 150 feet would likely benefit the species) to provide upland refugia for Suisun  
34 shrew (GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on Suisun shrew  
35 include:

- 36 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
37 loss of habitat and habitat fragmentation
- 38 • The habitat that would be restored and protected would consist of large blocks of contiguous  
39 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
40 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
41 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
42 increase population resilience to random environmental events and climate change.



- 1       • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
2       and converted (401 acres).

3       The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
4       and protection actions discussed above could result in the restoration of 6,006 acres and the  
5       protection of 232 acres of modeled habitat for Suisun shrew.

6       **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from  
7       Alternative 1A would represent an adverse effect as a result of habitat modification and potential  
8       direct mortality of a special-status species. However, the BDCP has committed to habitat protection,  
9       restoration, management, and enhancement associated with CM3, CM4, CM8 and CM11. This habitat  
10      protection, restoration, management, and enhancement would be guided by species-specific goals  
11      and objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the  
12      construction phase. Considering these commitments, losses and conversions of Suisun shrew habitat  
13      and potential mortality of individuals in both the near-term and late long-term under Alternative 1A  
14      would not be an adverse effect.

15      **CEQA Conclusion:**

16      **Near-Term Timeframe**

17      The near-term BDCP conservation strategy has been evaluated to determine whether it would  
18      provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
19      impacts of near-term covered activities would be less than significant under CEQA. Alternative 1A  
20      would impact 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These  
21      impacts include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary  
22      habitat being converted to primary habitat.

23      The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
24      wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
25      wetlands, of which approximately 150 feet would likely benefit the species. These Plan goals  
26      represent performance standards for considering the effectiveness of restoration actions. The acres  
27      of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
28      term Plan goals would keep pace with the loss of habitat and impacts on Suisun shrew.

29      Other factors relevant to effects on Suisun shrew include:

- 30      • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
31      loss of habitat and habitat fragmentation
- 32      • The habitat that would be restored and protected would consist of large blocks of contiguous  
33      tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
34      vegetation suitable for the species. This would provide greater habitat connectivity and greater  
35      habitat value and quantity, with is expected to accommodate larger populations and to therefore  
36      increase population resilience to random environmental events and climate change.
- 37      • The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount  
38      permanently lost (105 acres).

39      Because there are no project level impacts to Suisun shrew from CM1, the analysis of the effects and  
40      conservation actions does not include a comparison to standard ratios used for project level NEPA  
41      analyses.

1 The Plan also includes commitments to implement AMM1–AMM5 and AMM26. All of these AMMs  
2 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
3 areas. The AMMs are described in detail in BDCP Appendix 3.C.

4 These commitments are more than sufficient to support the conclusion that the near-term effects of  
5 Alternative 1A would be less than significant under CEQA.

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

7 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 1A  
8 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the  
9 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions  
10 (roughly 5% of the habitat in the study area). The Plan contains a commitment to restore or create  
11 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high  
12 marsh habitat (primary habitat for Suisun shrew) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated  
13 with CM4) and the protection and/or restoration of grassland adjacent to tidal restoration (areas  
14 within 200 feet of tidal restoration, of which approximately 150 feet would likely benefit the  
15 species) to provide upland refugia for Suisun shrew (GNC1.4, associated with CM3 and CM8). Other  
16 factors relevant to effects on Suisun shrew include:

- 17 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
18 loss of habitat and habitat fragmentation.
- 19 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
20 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
21 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
22 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
23 increase population resilience to random environmental events and climate change.
- 24 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
25 and converted (401 acres).

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
27 and protection actions discussed above could result in the restoration of 6,006 acres and the  
28 protection of 232 acres of modeled habitat for Suisun shrew.

29 Alternative 1A would result in substantial modifications to Suisun shrew habitat in the absence of  
30 other conservation actions. However, with habitat protection, restoration, management, and  
31 enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and  
32 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction  
33 period, Alternative 1A over the term of the BDCP would not result in a substantial adverse effect  
34 through habitat modifications and would not substantially reduce the number or restrict the range  
35 of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

### 36 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

37 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
38 and management and enhancement activities (CM11) could result in temporary noise and visual  
39 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.  
40 These potential effects would be minimized or avoided through AMM1–AMM5 and AMM26, which  
41 would be in effect throughout the term of the Plan.

1 The use of mechanical equipment during the implementation of the conservation measures could  
2 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and  
3 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species  
4 and its habitat. AMM1–AMM5 would minimize the likelihood of such spills occurring and would  
5 ensure measures are in place to prevent runoff from the construction area and potential effects of  
6 sediment on Suisun shrew.

7 Tidal marsh restoration has the potential to increase Suisun shrew’s exposure to mercury. Mercury  
8 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,  
9 which in the environment typically occurs in sediments subjected to regular wetting and drying  
10 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
11 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates  
12 are associated with high tidal marshes that experience intermittent wetting and drying and  
13 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be  
14 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal  
15 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh  
16 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations  
17 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and  
18 forage on earthworms and other prey that live within contaminated sediments (Talmage and  
19 Walton 1993; Hinton and Veiga 2002).

20 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
21 under the plan would generate less methylmercury than the existing managed wetlands. The  
22 potential for Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long  
23 term because the creation of tidal brackish emergent wetland would predominantly result from the  
24 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for project-  
25 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
26 management and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew  
27 resulting from BDCP tidal restoration.

28 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1A  
29 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either  
30 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that  
31 could substantially reduce the number of Suisun shrew, or restrict the species’ range. Therefore, the  
32 indirect effects of Alternative 1A would not have an adverse effect on Suisun shrew.

33 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
34 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during  
35 construction could cause the accidental release of petroleum or other contaminants that could  
36 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun  
37 shrew habitat could also impact the species. With implementation of AMM1–AMM5 and AMM26 as  
38 part of Alternative 1A construction, operation and maintenance, the BDCP would avoid the potential  
39 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in  
40 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of  
41 Suisun shrew. The indirect effects of BDCP Alternative 1A would have a less-than-significant impact  
42 on Suisun shrew.

43 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a  
44 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects

1 of methylmercury would not result in a substantial reduction in numbers or a restriction in the  
2 range of Suisun shrew, and, therefore, would have a less-than significant impact on the species.

### 3 **San Joaquin Kit Fox and American Badger**

4 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the  
5 American badger is restricted to grassland habitat west of Clifton Court Forebay along the study  
6 area's southwestern edge, in CZ 7– CZ 10.

7 The study area represents the extreme northeastern corner of the species' range in California, which  
8 extends westward and southward from the Plan Area border. The northern range of the San Joaquin  
9 kit fox (including the study area) was most likely marginal habitat historically and has been further  
10 degraded due to development pressures, habitat loss, and fragmentation (Clark et al. 2007). CNDDDB  
11 (California Department of Fish and Wildlife 2013) reports eight occurrences of San Joaquin kit foxes  
12 along the extreme western edge of the Plan Area within CZ 8, south of Brentwood (Figure 12-49).  
13 However, Clark et al. (2007) provide evidence that a number of CNDDDB occurrences in the northern  
14 portion of the species' range may be coyote pups misidentified as San Joaquin kit foxes. Smith et al.  
15 (2006) suggest that the northern range may possibly be a population sink for the San Joaquin kit fox.

16 Construction and restoration associated with Alternative 1A conservation measures would result in  
17 both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-4-  
18 59). Grassland restoration, and protection and management of natural communities could affect  
19 modeled San Joaquin kit fox habitat and potential American badger habitat. Full implementation of  
20 Alternative 1A would also include biological objectives over the term of the BDCP to benefit the San  
21 Joaquin kit fox which would also benefit American badger which uses similar habitat (BDCP Chapter  
22 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting  
23 and enhancing habitat in the northern extent of the species' range to increase the likelihood that San  
24 Joaquin kit fox may reside and breed in the Plan Area; and providing connectivity to habitat outside  
25 the Plan Area. The conservation measures that would be implemented to achieve the biological goals  
26 and objectives are summarized below.

- 27 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
28 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
29 associated with CM3-CM8, and CM11).
- 30 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
31 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 32 • Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali  
33 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 34 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and CZ 11, primarily in core  
35 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of  
36 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
37 associated with CM3).
- 38 • Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool  
39 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with  
40 CM3 and CM9).
- 41 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).

- 1 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
2 (Objective GNC1.2, associated with CM3 and CM8).
- 3 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
4 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
5 ASWNC2.3, associated with CM11).
- 6 • Increase prey, especially small mammals and insects, for grassland-foraging species in  
7 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal  
8 wetland complex (Objective ASWNC2.4, associated with CM11).
- 9 • Increase burrow availability for burrow-dependent species in grasslands surrounding vernal  
10 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with  
11 CM11).
- 12 • Increase prey, especially small mammals and insects, for grassland-foraging species in  
13 grasslands surrounding vernal pools within restored and protected vernal pool complex  
14 (Objective VPNC2.5, associated with CM11).
- 15 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
16 CM11).
- 17 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-  
18 foraging species (Objective GNC2.4, associated with CM11).

19 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
20 the implementation of AMMs to reduce potential effects, impacts on San Joaquin kit fox and  
21 American badger would not be adverse for NEPA purposes and would be less than significant for  
22 CEQA purposes.

23 **Table 12-1A-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 1A**  
24 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	173	173	167	167	NA	NA
<b>Total Impacts CM1</b>		<b>173</b>	<b>173</b>	<b>167</b>	<b>167</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Grassland	3	8	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>176</b>	<b>181</b>	<b>167</b>	<b>167</b>	<b>0</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**  
2 **and American Badger**

3 Alternative 1A would result in the permanent and temporary loss combined of up to 348 acres of  
4 modeled habitat for the San Joaquin kit fox (Table 12-1A-59). Because American badger uses  
5 grasslands for denning and foraging and shares the same geographic locations as the San Joaquin kit  
6 fox, effects on are anticipated to be the same as those described for San Joaquin kit fox. There is one  
7 San Joaquin kit fox and no American badger occurrences that overlap with the Plan footprint.  
8 Construction of Alternative 1A water conveyance facilities (CM1) and recreation facilities (CM11)  
9 would remove habitat. Habitat enhancement and management activities (CM11) could result in local  
10 adverse effects on species. In addition, construction vehicle activity could cause injury or mortality  
11 of San Joaquin kit foxes and badgers. Each of these individual activities is described below. Each of  
12 these individual activities is described below. A summary statement of the combined impacts and  
13 NEPA effects and a CEQA conclusion follow the individual conservation measure discussions

- 14 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the  
15 permanent loss of approximately 173 acres and the temporary loss of 167 acres of modeled San  
16 Joaquin kit fox habitat and American badger habitat. This habitat is located in areas of  
17 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to  
18 Clifton Court Forebay, in CZ 8.
- 19 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
20 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin  
21 kit fox modeled habitat. *AMM24 San Joaquin Kit Fox*, would be implemented to ensure that San  
22 Joaquin kit fox dens are avoided, as described in BDCP Appendix 3.C, *Avoidance and*  
23 *Minimization Measures*. Passive recreation in the reserve system could result in disturbance of  
24 San Joaquin kit foxes at their den site. Natal and pupping dens would be particularly vulnerable  
25 to human disturbance. Additionally, disease could be transmitted from domestic dogs that enter  
26 the reserve system with recreational users. However, *AMM37 Recreation* would prohibit  
27 construction of new trails within 250 feet of active San Joaquin kit fox dens. Existing trails would  
28 be closed within 250 feet of active natal/pupping dens until young have vacated, and within 50  
29 feet of other active dens. No dogs would be allowed on reserve units with active San Joaquin kit  
30 fox populations. Rodent control would be prohibited even on grazed or equestrian access areas  
31 with San Joaquin kit fox populations. With these restrictions, recreation-related effects on San  
32 Joaquin kit fox are expected to be minimal.

33 The BDCP would require the protection of grasslands in large patch sizes connected to existing  
34 large areas of grassland, habitat corridors and transition habitat areas to improve the ecological  
35 functions of the grasslands necessary to support the San Joaquin kit fox. American badger is  
36 expected to benefit in a similar fashion.

37 The BDCP would require the enhancement and management of these protected existing  
38 grasslands and restored grasslands to improve their function as a natural community of plants  
39 and wildlife and for associated covered species, including San Joaquin kit fox. The BDCP also  
40 includes actions to improve rodent prey availability.

41 However, management activities could result in injury or mortality of San Joaquin kit fox or  
42 American badger if individuals were present in work sites or if dens were located in the vicinity  
43 of habitat management work sites. A variety of habitat management actions included in *CM11*  
44 that are designed to enhance wildlife values on protected lands may result in localized ground  
45 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American

1 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal  
2 of nonnative vegetation and road and other infrastructure maintenance activities, are expected  
3 to have minor effects on available habitat and are expected to result in overall improvements to  
4 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.  
5 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
6 minimized through the AMMs listed below. These AMMs would remain in effect throughout the  
7 BDCP's construction phase.

- 8 • Operations and maintenance: Ongoing maintenance of BDCP facilities would be expected to have  
9 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction  
10 operations and maintenance of the above-ground water conveyance facilities and restoration  
11 infrastructure could result in ongoing but periodic disturbances that could affect either species'  
12 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would  
13 include vegetation management, levee and structure repair, and regrading of roads and  
14 permanent work areas. These effects, however, would be minimized with implementation of  
15 AMM1-AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,  
16 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*  
17 *Badger*.
- 18 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of  
19 either species. If San Joaquin kit fox or American badger reside where activities take place (most  
20 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land  
21 clearing, construction, operations and maintenance, and restoration, enhancement, and  
22 management activities could result in injury to or mortality of either species. Measures would be  
23 implemented to avoid and minimize injury to or mortality of these species as described in  
24 AMM1-AMM6, AMM10, and AMM24 (see BDCP Appendix 3.C) and Mitigation Measure BIO-162.

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

### 28 ***Near-Term Timeframe***

29 Because water conveyance facilities construction is being evaluated at the project level, the near-  
30 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
31 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
32 not be adverse under NEPA.

33 Under Alternative 1A there would be a loss of 343 acres of San Joaquin kit fox modeled habitat and  
34 American badger habitat from CM1 (340 acres) and CM11 (3 acres).

35 Typical NEPA project-level mitigation ratio for the natural community that would be affected and  
36 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the  
37 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 686 acres of  
38 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

39 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
40 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
41 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
42 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
43 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities

1 are expected to be concluded during the first 10 years of Plan implementation, which is close  
2 enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes.  
3 These commitments are more than sufficient to support the conclusion that the near-term effects of  
4 Alternative 1A would be not be adverse under NEPA, because the number of acres required to meet  
5 the typical ratios described above would be only 686 acres of grassland protected.

6 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger  
7 habitat from Alternative 1A would represent an adverse effect as a result of habitat modification and  
8 potential direct mortality of a special-status species. However, the effects of Alternative 1A would  
9 not be adverse with habitat protection, restoration, management, and enhancement in addition to  
10 implementation of *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management*  
11 *Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment*  
12 *Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and*  
13 *Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, *AMM10 Restoration of Temporarily*  
14 *Affected Natural Communities*, *AMM24 San Joaquin Kit Fox*, and *AMM37 Recreation*. These AMMs  
15 contain elements that avoid or minimize the risk of construction activity affecting habitat and  
16 species adjacent to work areas and disposal sites. BDCP Appendix 3.C describes the AMMs in detail.  
17 Remaining effects would be addressed by implementation of Mitigation Measure BIO-162, *Conduct*  
18 *Preconstruction Survey for American Badger*.

#### 19 **Late Long-Term Timeframe**

20 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1A as a  
21 whole would result in the permanent loss of and temporary effects on 348 acres of modeled habitat  
22 for San Joaquin kit fox and potential habitat for American badger, representing 6% of the modeled  
23 habitat.

24 With full implementation of Alternative 1A, at least 1,000 acres of grassland would be protected in  
25 CZ 8, where the San Joaquin kit fox is most likely to occur if present in the study area. Additionally, a  
26 portion of the 2,000 acres of grassland restoration would likely occur in CZ 8. Assuming the restored  
27 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
28 modeled habitat in this natural community in the study area (6.8% of the grasslands in the Plan Area  
29 consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands would  
30 be suitable for the species (6.6% of 2,000 acres).

31 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square  
32 miles; see BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the  
33 conservation of the species. Grasslands would be acquired for protection in locations that provide  
34 connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining  
35 San Joaquin kit fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat  
36 adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes, if present, to  
37 larger habitat patches outside of the Plan Area in Contra Costa County. Grassland protection would  
38 focus in particular on acquiring the largest remaining contiguous patches of unprotected grassland  
39 habitat, which are located south of SR 4 in CZ 8 (BDCP Appendix 2.A, *Covered Species Accounts*). This  
40 area connects to over 620 acres of existing habitat that was protected under the East Contra Costa  
41 County HCP/NCCP.

42 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to  
43 increase mammal burrows, which could benefit the San Joaquin kit fox by increasing potential den  
44 sites, which are a limiting factor for the San Joaquin kit fox in the northern portion of its range



1 (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, Objective  
2 GNC2.4). These management and enhancement actions are expected to benefit the San Joaquin kit  
3 fox by increasing the habitat value of the protected and restoration grasslands.

4 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
5 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
6 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
7 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
8 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
9 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
10 construction.

11 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
12 and protection actions discussed above, as well as the restoration of grassland and vernal pool that  
13 could overlap with the species model, would result in the restoration of 131 acres of modeled  
14 habitat for San Joaquin kit fox. In addition, protection of grassland and vernal pool complex could  
15 overlap with the species model and would result in the protection of 1,011 acres of modeled habitat  
16 for San Joaquin kit fox.

17 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and  
18 American badger habitat from Alternative 1A would represent an adverse effect as a result of  
19 habitat modification and potential direct mortality of special-status species. However, with habitat  
20 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11,  
21 guided by AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the  
22 construction period, and with implementation of Mitigation Measure BIO-162, the effects of  
23 Alternative 1A as a whole on San Joaquin kit fox and American badger would not be adverse under  
24 NEPA.

25 **CEQA Conclusion:**

26 **Near-Term Timeframe**

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

31 Under Alternative 1A there would be a loss of 343 acres of San Joaquin kit fox modeled habitat and  
32 American badger habitat from CM1 (340 acres) and CM11 (3 acres).

33 Typical CEQA project-level mitigation ratio for the natural community that would be affected and  
34 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the  
35 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 686 acres of  
36 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

37 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
38 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
39 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
40 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
41 acres of grassland (Objective GNC1.1).

1 These conservation actions would occur in the same timeframe as the construction losses, thereby  
2 avoiding adverse effects of habitat loss on San Joaquin kit fox and American badger. These Plan  
3 objectives represent performance standards for considering the effectiveness of CM3 protection and  
4 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
5 and the additional detail in the biological objectives for San Joaquin kit fox and the mitigation  
6 measure for American badger satisfy the typical mitigation that would be applied to the project-level  
7 effects of CM1, as well as mitigate the near-term effects of the other conservation measures.

8 The BDCP also contains commitments to implement AMM1–6, AMM10, AMM24, and AMM37 which  
9 include elements that avoid or minimize the risk of construction activity impacting habitat and  
10 species adjacent to work areas and storage sites. Remaining effects would be addressed by  
11 implementation of Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*  
12 *Badger*. BDCP Appendix 3.C describes the AMMs in detail.

13 These commitments are more than sufficient to support the conclusion that the near-term impacts  
14 of Alternative 1A on San Joaquin kit fox and American badger would be less than significant under  
15 CEQA, because the number of acres required to meet the typical ratios described above would be  
16 only 686 acres of grassland protected.

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

18 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1A as a  
19 whole would result in the permanent and temporary loss of 348 acres of modeled habitat for San  
20 Joaquin kit fox, and potential habitat for American badger representing 6% of the modeled habitat.

21 With full implementation of Alternative 1A, at least 1,000 acres of grassland would be protected in  
22 CZ 8, where the San Joaquin kit fox is most likely to occur if present in the study area. Additionally, a  
23 portion of the 2,000 acres of grassland restoration would likely occur in CZ 8. Assuming the restored  
24 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
25 modeled habitat in this natural community in the study area (6.8% of the grasslands in the study  
26 area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands  
27 would be suitable for the species (6.6% of 2,000 acres).

28 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see  
29 BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the  
30 species. Grasslands would be acquired for protection in locations that provide connectivity to  
31 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit  
32 fox habitat within and adjacent to the study area. Connectivity to occupied habitat adjacent to the  
33 study area would help ensure the movement of San Joaquin kit foxes, if present, to larger habitat  
34 patches outside of the study area in Contra Costa County. Grassland protection would focus in  
35 particular on acquiring the largest remaining contiguous patches of unprotected grassland habitat,  
36 which are located south of SR 4 in CZ 8 (BDCP Appendix 2.A, *Covered Species Accounts*). This area  
37 connects to over 620 acres of existing habitat that was protected under the East Contra Costa  
38 County HCP/NCCP.

39 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to  
40 increase mammal burrows, which could benefit the San Joaquin kit fox by increasing potential den  
41 sites, which are a limiting factor for the San Joaquin kit fox in the northern portion of its range  
42 (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, Objective  
43 GNC2.4). These management and enhancement actions are expected to benefit the San Joaquin kit

1 fox as well as the American badger by increasing the habitat value of the protected and restoration  
2 grasslands.

3 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
4 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
5 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
6 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
7 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
8 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
9 construction.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
11 and protection actions discussed above, as well as the restoration of grassland and vernal pool that  
12 could overlap with the species model, would result in the restoration of 131 acres of modeled  
13 habitat for San Joaquin kit fox. In addition, protection of grassland and vernal pool complex could  
14 overlap with the species model and would result in the protection of 1,011 acres of modeled habitat  
15 for San Joaquin kit fox.

16 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger  
17 habitat from Alternative 1A would represent a significant impact as a result of habitat modification  
18 and potential direct mortality of a special-status species. However, with habitat protection,  
19 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by  
20 AMM1-AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the time period  
21 of construction, and with implementation of Mitigation Measure BIO-162, the impact of Alternative  
22 1A as a whole on San Joaquin kit fox and American badger would be less than significant.

### 23 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

24 A qualified biologist provided by DWR will survey for American badger concurrent with the  
25 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the  
26 biologist will passively relocate badgers out of the work area prior to construction if feasible. If  
27 an active den is detected within the work area, DWR will avoid the den until the qualified  
28 biologist determines the den is no longer active. Dens that are determined to be inactive by the  
29 qualified biologist will be collapsed by hand to prevent occupation of the den between the time  
30 of the survey and construction activities.

### 31 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 32 **American Badger**

33 Noise and visual disturbances outside the project footprint but within 250 feet of construction  
34 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American  
35 badger. Water conveyance facilities operations and maintenance activities would include vegetation  
36 and weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
37 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
38 activities are not expected to remove San Joaquin kit fox and badger habitat, operation of equipment  
39 could disturb small areas of vegetation around maintained structures and could result in injury or  
40 mortality of individual foxes and badgers, if present. Given the remote likelihood of active San  
41 Joaquin kit fox or badger dens in the vicinity of the conveyance facilities, the potential for this effect  
42 is small. The effect would further be minimized with the implementation of seasonal no-disturbance

1 buffers around occupied dens, and other measures as described in AMM1–AMM6, AMM10, AMM24,  
2 and AMM37 and Mitigation Measure BIO-162.

3 **NEPA Effects:** Implementation of the AMMs listed above and Mitigation Measure BIO-162, *Conduct*  
4 *Preconstruction Survey for American Badger*, would avoid the potential for substantial adverse  
5 effects on San Joaquin kit fox or American badger, either indirectly or through habitat modifications.  
6 These measures would also avoid and minimize effects that could substantially reduce the number  
7 of San Joaquin kit fox or American badger, or restrict either species' range. Therefore, the indirect  
8 effects of Alternative 1A would not have an adverse effect on San Joaquin kit fox or American badger.

9 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
10 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American  
11 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative  
12 1A construction, operation, and maintenance, the BDCP would avoid the potential for significant  
13 adverse effects on either species, either indirectly or through habitat modifications, and would not  
14 result in a substantial reduction in numbers or a restriction in the range of either species. In  
15 addition, Mitigation Measure BIO-162 would reduce the impact of indirect effects of Alternative 1A  
16 on American badger to a less-than-significant level.

#### 17 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

18 Please see Mitigation Measure BIO-162 under Impact BIO-162.

#### 19 **San Joaquin Pocket Mouse**

20 This section describes the effects of Alternative 1A, including water conveyance facilities  
21 construction and implementation of other conservation components, on San Joaquin pocket mouse.  
22 Habitat for this species consists of the grassland natural community throughout the Plan Area. The  
23 species requires friable soils for burrowing.

24 Construction and restoration associated with Alternative 1A conservation measures would result in  
25 both temporary and permanent losses of San Joaquin pocket mouse habitat as indicated in Table 12-  
26 1A-60. Full implementation of Alternative 1A would also include the following conservation actions  
27 over the term of the BDCP that would likely benefit San Joaquin pocket mouse.

- 28 ● Protect 8,000 acres of grasslands (GNC1.1, associated with CM3).
- 29 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands  
30 (GNC1.2, associated with CM8).
- 31 ● Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water  
32 availability, soil chemistry, soil texture, topography, and disturbance regimes, with  
33 consideration of historical states (GNC2.1).

34 As explained below, with the restoration or protection of these amounts of habitat, impacts to San  
35 Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant  
36 for CEQA purposes for Alternative 1A.

1 **Table 12-1A-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 1A**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	315	315	262	262	NA	NA
<b>Total Impacts CM1</b>		<b>315</b>	<b>315</b>	<b>262</b>	<b>262</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Grassland	889	2,056	239	273	385–1,277	514
<b>Total Impacts CM2–CM18</b>		<b>889</b>	<b>2,056</b>	<b>239</b>	<b>273</b>	<b>385–1,277</b>	<b>514</b>
<b>TOTAL IMPACTS</b>		<b>1,204</b>	<b>2,371</b>	<b>501</b>	<b>535</b>	<b>385–1,277</b>	<b>514</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**  
5 **Mouse**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss  
7 of up to 2,906 acres of habitat for San Joaquin pocket mouse (of which 2,371 acres would be a  
8 permanent loss and 535 acres would be a temporary loss of habitat, Table 12-1A-60). Conservation  
9 measures that would result in these losses are conveyance facilities and transmission line  
10 construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries*  
11 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
12 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*  
13 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*, and *CM18*  
14 *Conservation Hatcheries*. The majority of habitat loss would result from CM4. Habitat enhancement  
15 and management activities (CM11), which include ground disturbance or removal of nonnative  
16 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
18 facilities could degrade or eliminate San Joaquin pocket mouse habitat. Each of these individual  
19 activities is described below. A summary statement of the combined impacts and NEPA and CEQA  
20 conclusions follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
22 result in the combined permanent and temporary loss of up to 577 acres of potential San  
23 Joaquin pocket mouse habitat (315 acres of permanent loss, 262 acres of temporary loss) in CZ  
24 3-CZ 6 and CZ 8. The majority of grassland that would be removed would be in CZ 8, from the  
25 construction around Clifton Court Forebay. Refer to the Terrestrial Biology Map Book for a  
26 detailed view of Alternative 1A construction locations. Construction of the forebay would affect

1 the area where there is a record of San Joaquin pocket mouse (California Department of Fish and  
2 Wildlife 2013).

- 3 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
4 (CM2) would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in  
5 the Yolo Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the  
6 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe  
7 Drain/Tule Canal, and along the west side channels.
- 8 • *CM4 Tidal Habitat Restoration*: Tidal habitat restoration (CM4) site preparation and inundation  
9 would permanently remove an estimated 1,122 acres of potential San Joaquin pocket mouse  
10 habitat. The majority of the losses would likely occur in the vicinity of Cache Slough, on Decker  
11 Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands  
12 adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact and  
13 fragment remaining grassland just north of Rio Vista in and around French and Prospect Islands,  
14 and in an area south of Rio Vista around Threemile Slough.
- 15 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
16 seasonally inundated floodplain (CM5) would permanently and temporarily remove  
17 approximately 85 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary).  
18 These losses would be expected to occur along the San Joaquin River and other major  
19 waterways in CZ 7.
- 20 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would impact 410 acres of  
21 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and  
22 seasonal floodplain restoration (399 acres).
- 23 • *CM9 Verna Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland  
24 would be permanently converted to vernal pool complex. The vernal pool and alkali seasonal  
25 wetland restoration would leave intact the grasslands surrounding the vernal pools. Temporary  
26 construction-related disturbance of grassland habitat would result from implementation of *CM9*  
27 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value  
28 habitat after the construction periods.
- 29 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
30 and recreational staging areas would result in the permanent removal of 50 acres of grassland.  
31 The protection of 8,000 acres of grassland for covered species is also expected to benefit San  
32 Joaquin pocket mouse by protecting existing habitats from potential loss or degradation that  
33 otherwise could occur with future changes in existing land use. Habitat management and  
34 enhancement-related activities could cause disturbance or direct mortality to San Joaquin  
35 pocket mouse if they are present near work areas.

36 A variety of habitat management actions included in CM11 that are designed to enhance wildlife  
37 values in restored or protected habitats could result in localized ground disturbances that could  
38 temporarily remove small amounts of San Joaquin pocket mouse habitat. Ground-disturbing  
39 activities, such as removal of nonnative vegetation and road and other infrastructure  
40 maintenance activities, would be expected to have minor adverse effects on habitat and would  
41 be expected to result in overall improvements to and maintenance of habitat values over the  
42 term of the BDCP. Noise and visual disturbance from management-related equipment operation  
43 could temporarily displace individuals or alter the behavior of the species if adjacent to work  
44 areas. With full implementation of the BDCP, enhancement and management actions designed

1 for western burrowing owl would also be expected to benefit these species. San Joaquin pocket  
2 mouse would benefit particularly from protection of grassland habitat against potential loss or  
3 degradation that otherwise could occur with future changes in existing land use.

- 4 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San  
5 Joaquin pocket mouse habitat.
- 6 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
8 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.  
9 Maintenance activities would include vegetation management, levee and structure repair, and  
10 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
11 AMMs and conservation actions as described below.
- 12 • *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket  
13 mouse if present in construction areas.

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

#### 17 ***Near-Term Timeframe***

18 Because the water conveyance facility construction is being evaluated at the project level, the near-  
19 term BDCP conservation strategy has been evaluated to determine whether it would provide  
20 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
21 effects of such conveyance facility construction would not be adverse under NEPA and would be less  
22 than significant under CEQA. Alternative 1A would remove 1,714 acres of San Joaquin pocket mouse  
23 habitat (1,204 permanent, 371 temporary) in the study area in the near-term. One record of San  
24 Joaquin pocket mouse near Clifton Court forebay could be affected by the construction of the new  
25 forebay. These effects would result from the construction of the water conveyance facilities (CM1,  
26 577 acres), and implementing other conservation measures (Yolo Bypass Fisheries Enhancement  
27 [CM2] Tidal Natural Communities Restoration [CM4], Seasonally Inundated Floodplain Restoration  
28 [CM5], Riparian Natural Community Restoration (CM7), Vernal Pool and Alkali Seasonal Wetland  
29 Complex Restoration [CM9], Natural Community Enhancement and Management – Recreation  
30 Facilities (CM11), and Conservation Hatcheries [CM18] 1,128 acres).

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
32 CM1 would be 2:1 protection of grassland habitat. Using these typical ratios would indicate that  
33 1,154 acres of grassland natural communities should be protected to mitigate the CM1 losses of 577  
34 acres of San Joaquin pocket mouse habitat. The near-term effects of other conservation actions  
35 would remove 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of  
36 San Joaquin pocket mouse habitat using the same typical NEPA and CEQA ratios (2:1 for protection).

37 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
38 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and  
39 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,  
40 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and  
41 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
42 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the  
43 management of the grasslands for general wildlife benefit.

1 These natural community biological goals and objectives would inform the near-term protection and  
2 restoration efforts and represent performance standards for considering the effectiveness of  
3 restoration actions for the species. The acres of protection and restoration contained in the near-  
4 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
5 effects of CM1 especially considering that a large portion of the impacts to grasslands consists of  
6 thin strips of grassland along levees and that areas of grassland protection and restoration would be  
7 in large contiguous blocks.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
9 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
10 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment and*  
11 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material, and AMM10 Restoration of Temporary Impacts. All of these AMMs include elements that*  
13 *avoid or minimize the risk of affecting habitats and species adjacent to work areas and RTM storage*  
14 *sites. The AMMs are described in detail in BDCP Appendix 3.C.*

### 15 ***Late Long-Term Timeframe***

16 The habitat model indicates that the study area supports approximately 78,047 acres of potential  
17 habitat for San Joaquin pocket mouse. Alternative 1A as a whole would result in the permanent loss  
18 of and temporary effects on 2,906 acres of grasslands that could be suitable for San Joaquin pocket  
19 mouse (4% of the habitat in the study area). The locations of these losses are described above in the  
20 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
21 at least 2,000 acres of grassland in CZ 1, 8 and 11 (GNC1.2) and to protect 8,000 acres of grassland  
22 (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres  
23 protected in CZ 11, and the remainder distributed throughout CZ 1, 2, 4, 5, 7, 8, and 11 in the study  
24 area)(GNC1.1). The Plan's commitment to restore grasslands such that they connect fragmented  
25 patches of already protected grasslands (GNC1.2) would improve habitat connectivity and dispersal  
26 abilities of San Joaquin pocket mouse within and outside of the plan area. All protected habitat  
27 would be managed under *CM11 Natural Communities Enhancement and Management.*

28 ***NEPA Effects:*** In the near-term, the loss of San Joaquin pocket mouse habitat and potential for direct  
29 mortality would not be adverse because the BDCP has committed to protecting and restoring an  
30 acreage that would meet the typical mitigation ratios described above. In the late long-term, the  
31 effects on San Joaquin pocket mouse habitat and potential mortality of a special-status species  
32 resulting from Alternative 1A would represent an adverse effect in the absence of other  
33 conservation actions. However, the BDCP has committed to habitat protection and restoration  
34 associated with CM3, CM8, and CM11. This habitat protection and restoration would be guided by  
35 biological goals and objectives and by AMM1–AMM6 and AMM10, which would be in place during  
36 construction activity. Considering these commitments, losses of San Joaquin pocket mouse habitat  
37 and potential mortality under Alternative 1A would not be an adverse effect.

### 38 ***CEQA Conclusion:***

#### 39 ***Near-Term Timeframe***

40 Because the water conveyance facility construction is being evaluated at the project level, the near-  
41 term BDCP conservation strategy has been evaluated to determine whether it would provide  
42 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
43 effects of such conveyance facility construction would not be adverse under NEPA and would be less



1 than significant under CEQA. Alternative 1A would remove 1,714 acres of modeled (1,204  
2 permanent, 371 temporary) habitat for San Joaquin pocket mouse in the study area in the near-  
3 term. One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the  
4 construction of the new forebay. These effects would result from the construction of the water  
5 conveyance facilities (CM1, 577 acres), and implementing other conservation measures (Yolo  
6 Bypass Fisheries Enhancement [CM2] Tidal Natural Communities Restoration [CM4], Seasonally  
7 Inundated Floodplain Restoration [CM5], Riparian Natural Community Restoration (CM7), Vernal  
8 Pool and Alkali Seasonal Wetland Complex Restoration [CM9], Natural Community Enhancement  
9 and Management – Recreation Facilities (CM11), and Conservation Hatcheries [CM18] 1,128 acres).

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
11 CM1 would be 2:1 protection of grassland habitat. Using these typical ratios would indicate that  
12 1,154 acres of grassland natural communities should be protected to mitigate the CM1 losses of 577  
13 acres of San Joaquin pocket mouse habitat. The near-term effects of other conservation actions  
14 would remove 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of  
15 San Joaquin pocket mouse habitat using the same typical NEPA and CEQA ratios (2:1 for protection).

16 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
17 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and  
18 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,  
19 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and  
20 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
21 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the  
22 management of the grasslands for general wildlife benefit.

23 These natural community biological goals and objectives would inform the near-term protection and  
24 restoration efforts and represent performance standards for considering the effectiveness of  
25 restoration actions for the species. The acres of protection and restoration contained in the near-  
26 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
27 effects of CM1 especially considering that a large portion of the impacts to grasslands consists of  
28 thin strips of grassland along levees and that areas of grassland protection and restoration would be  
29 in large contiguous blocks.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities Temporary Impacts*.  
35 All of these AMMs include elements that avoid or minimize the risk of affecting habitats and species  
36 adjacent to work areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix  
37 3.C.

38 These commitments are more than sufficient to support the conclusion that the near-term effects of  
39 Alternative 1A would be less than significant under CEQA.

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

41 The habitat model indicates that the study area supports approximately 78,047 acres of potential  
42 habitat for San Joaquin pocket mouse. Alternative 1A as a whole would result in the permanent loss  
43 of and temporary effects on 2,906 acres of grasslands that could be suitable for San Joaquin pocket

1 mouse (4% of the habitat in the study area). The locations of these losses are described above in the  
2 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
3 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11 (Objective GNC1.2) and to protect 8,000  
4 acres of grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least  
5 2,000 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ  
6 7, CZ 8, and CZ 11 in the study area) (Objective GNC1.1). The Plan's commitment to restore  
7 grasslands such that they connect fragmented patches of already protected grasslands (Objective  
8 GNC1.2) would improve habitat connectivity and dispersal abilities of San Joaquin pocket mouse  
9 within and outside of the Plan Area. All protected habitat would be managed under *CM11 Natural*  
10 *Communities Enhancement and Management*.

11 Considering these protection and restoration provisions, which would provide acreages of new  
12 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction  
13 and restoration activities, and with implementation of AMM1-AMM6, and AMM10, the loss of  
14 habitat or direct mortality through implementation of Alternative 1A would not result in a  
15 substantial adverse effect through habitat modifications and would not substantially reduce the  
16 number or restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or potential  
17 mortality under this alternative would have a less-than-significant impact on San Joaquin pocket  
18 mouse.

#### 19 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

20 Construction activities associated with water conveyance facilities, conservation components and  
21 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
22 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
23 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and  
24 its habitat over the term of the BDCP. These potential effects would be minimized and avoided  
25 through AMM1-AMM6, and AMM10, which would be in effect throughout the plan's construction  
26 phase.

27 Water conveyance facilities operations and maintenance activities would include vegetation and  
28 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
29 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
30 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb  
31 small areas of vegetation around maintained structures and could result in injury or mortality of  
32 individual pocket mice, if present.

33 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial  
34 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.  
35 These measures would also avoid and minimize effects that could substantially reduce the number  
36 of San Joaquin pocket mouse, or restrict the species' range. Therefore, the indirect effects of  
37 Alternative 1A would not have an adverse effect on San Joaquin pocket mouse.

38 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
39 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With  
40 implementation of AMM1-AMM6, and AMM10 as part of Alternative 1A construction, operation, and  
41 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,  
42 either indirectly or through habitat modifications, and would not result in a substantial reduction in  
43 numbers or a restriction in the range of the species. Therefore, the indirect effects under this  
44 alternative would have a less-than-significant impact on San Joaquin pocket mouse.

## 1 Special-Status Bat Species

2 Special-status bat species with potential to occur in the study area employ varied roost strategies,  
3 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as  
4 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,  
5 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats  
6 roosting habitat includes valley/foothill riparian natural community, developed lands and  
7 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all  
8 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

9 There is potential for at least thirteen different bat species to be present in the study area (Figure  
10 12-51), including four California species of special concern and nine species ranked from low to  
11 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A, *Special-Status*  
12 *Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that  
13 involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats (see  
14 Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report* for  
15 details on methods and results, and Table 12A-2 in Appendix 12A).

16 The majority of the parcels assessed during field surveys contained bat foraging and roosting  
17 features and were considered highly suitable habitat. At the time of the 2009 field surveys, DWR  
18 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not  
19 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was  
20 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was  
21 observed at 26 of the bridges. Biologists observed Mexican free-tailed bats at four of the bridges and  
22 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,  
23 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second  
24 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

25 The remaining 89 bridges contained structural features that were considered conducive to  
26 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more  
27 often have box beams or other less protected roosting spots where bats rest temporarily while  
28 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where  
29 bats are protected from predators and weather. Seventeen bridges in the survey area had no  
30 potential for roosting because they lacked surface features from which bats could hang and offered  
31 no protection from weather or predators.

32 Construction and restoration associated with Alternative 1A conservation measures would result in  
33 both temporary and permanent losses of foraging and roosting habitat for special-status bats as  
34 indicated in Table 12-1A-61. Protection and restoration for special-status bat species focuses on  
35 habitats and does not include manmade structures such as bridges. The conservation measures that  
36 would be implemented to achieve the biological goals and objectives that would also benefit special-  
37 status bats are summarized below.

- 38 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated  
39 with CM3). This objective includes protecting and restoring a variety of habitat types described  
40 below (Table 3.3-4 in BDCP Chapter 3).
  - 41 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
42 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).

- 1           ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with  
2           CM3).
- 3           ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 4           ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and  
5           CM11).
- 6           ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and  
7           CM11).
- 8           ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant  
9           garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
- 10          ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
11          GNC1.2, associated with CM3 and CM8).
- 12          ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and CM9).
- 13          ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated  
14          with CM2, 3, and 4).
- 15          ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective  
16          VFRNC1.1, associated with CM3 and CM7).
- 17          ○ Protect 750 acres of existing valley/foothill riparian natural community in C Z7 by year 10  
18          (Objective VFRNC1.2, associated with CM3).

19          As explained below, with the restoration and protection of these amounts of habitat, in addition to  
20          mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse  
21          for NEPA purposes and would be less than significant for CEQA purposes.

1  
2

**Table 12-1A-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with Alternative 1A<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Roosting	220	220	213	213	NA	NA
	Foraging	4,389	4,389	2,782	2,782	NA	NA
<b>Total Impacts CM1</b>		<b>4,609</b>	<b>4,609</b>	<b>2,995</b>	<b>2,995</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
<b>Total Impacts CM2-CM18</b>		<b>15,021</b>	<b>61,969</b>	<b>940</b>	<b>2,338</b>	<b>21,589</b>	<b>10,548</b>
<b>TOTAL IMPACTS</b>		<b>19,630</b>	<b>66,577</b>	<b>3,935</b>	<b>5,333</b>	<b>21,589</b>	<b>10,548</b>

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

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

<sup>c</sup> Affected roosting habitat acreages include valley/foothill riparian habitat and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

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

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

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

5 Alternative 1A conservation measure CM1 would result in the permanent and temporary loss  
6 combined of up to 433 acres of roosting habitat and 7,171 acres of foraging habitat for special-status  
7 bats in the study area. DWR identified one bridge as potential night roosting habitat that could be  
8 affected by construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements  
9 (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5) and would result in the  
10 permanent and temporary loss of 1,782 acres of roosting habitat and the conversion of  
11 approximately 65,525 acres of foraging habitat from mostly cultivated lands and managed wetlands  
12 to tidal and nontidal wetlands. Foraging habitat effects for CM2-CM18 were not considered adverse  
13 as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another  
14 foraging habitat (wetlands). Habitat enhancement and management activities (CM11) could result in  
15 local adverse effects. In addition, maintenance activities associated with the long-term operation of  
16 the water conveyance facilities and other BDCP physical facilities could affect special-status bat  
17 habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follows the  
18 individual conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would  
2 result in the permanent loss of approximately 220 acres of roosting habitat and 4,389 acres of  
3 foraging habitat in the study area. Development of the water conveyance facilities would also  
4 result in the temporary removal of up to 213 acres of roosting habitat and up to 2,782 acres of  
5 foraging habitat for special-status bats in the study area (Table 12-1A-61). DWR identified one  
6 bridge with potential night roosting habitat in a shaft location that could be permanently  
7 affected by construction for CM1.
- 8       ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
9 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be  
10 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and  
11 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony  
12 of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be  
13 affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct*  
14 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that  
15 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 16       ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
17 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into  
18 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting  
19 habitat for special-status bats would permanently be affected. This habitat is of low value,  
20 consisting of a small, isolated patch surrounded by cultivated lands, and the species have a  
21 relatively low likelihood of being present in these areas. The roosting habitat that would be  
22 removed consists of relatively small and isolated patches along canals and irrigation ditches  
23 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small  
24 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*  
25 *Surveys for Roosting Bats and Implement Protective Measures*, requires that tidal natural  
26 communities restoration avoid effects on roosting special-status bats.
- 27       ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
28 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into  
29 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent  
30 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status  
31 bats in the study area.
- 32       ● *CM11 Natural Communities Enhancement and Management*: Implementation of Alternative 1A  
33 would result in an overall benefit to special-status bats within the study area through protection  
34 and restoration of their foraging and roosting habitats. The majority of affected acres would  
35 convert agricultural land to natural communities with higher potential foraging and roosting  
36 value, such as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored  
37 foraging habitats primarily would replace agricultural lands. Restored habitats are expected to  
38 be of higher function because the production of flying insect prey species is expected to be  
39 greater in restored wetlands and uplands on which application of pesticides would be reduced  
40 relative to affected agricultural habitats. Noise and visual disturbances during implementation  
41 of riparian habitat management actions could result in temporary disturbances that, if bat roost  
42 sites are present, could cause temporary abandonment of roosts. This effect would be  
43 minimized with implementation of Mitigation Measure BIO-166.
- 44       ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
45 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of

1 the above-ground water conveyance facilities and restoration infrastructure could result in  
2 ongoing but periodic disturbances that could affect special-status bat use of the surrounding  
3 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ  
4 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,  
5 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
6 however, would be minimized with implementation of the mitigation measures described  
7 below.

- 8 • Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,  
9 such as grading, the movement of construction vehicles or heavy equipment, and the installation  
10 of water conveyance facilities components and new transmission lines, may result in the direct  
11 mortality, injury, or harassment of roosting special-status bats. Construction activities related to  
12 conservation components could have similar affects. Preconstruction surveys would be  
13 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed  
14 while bats are present, as described below in the mitigation measures.

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

### 18 ***Near-Term Timeframe***

19 Because water conveyance facilities construction is being evaluated at the project level, the near-  
20 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
21 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
22 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land  
23 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and  
24 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting  
25 habitat for CM1, CM2, and CM4 in the near-term.

26 Alternative 1A would permanently or temporarily affect 1,124 acres of roosting habitat for special-  
27 status bats in the near-term as a result of implementing CM1 (433 acres roosting habitat), CM2 (256  
28 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in  
29 the late long-term. Most of the roosting habitat losses would occur in an valley/foothill riparian.

30 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
31 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
32 natural community. Using these ratios would indicate that 1,124 acres of riparian habitat should be  
33 restored and 1,124 acres of riparian habitat should be protected.

34 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status  
35 bats within the study area through protection and restoration of their foraging and roosting habitats  
36 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
37 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities  
38 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
39 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
40 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
41 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
42 Objective GNC1.1.). Restored habitats are expected to be of higher function because the production  
43 of flying insect prey species is expected to be greater in restored wetlands and uplands on which

1 application of pesticides would be reduced relative to affected agricultural habitats. Conservation  
2 components in the near-term would sufficiently offset the adverse effects resulting from near-term  
3 effects from Alternative 1A.

4 In addition, activities associated with natural communities enhancement and protection and with  
5 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
6 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
7 described below, requires preconstruction surveys to reduce these effects.

8 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
9 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
10 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material, and AMM10 Restoration of Temporarily Affected Natural Communities. These AMMs include*  
13 *elements that avoid or minimize the risk of construction activity affecting habitat and species*  
14 *adjacent to work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C,*  
15 *Avoidance and Minimization Measures*

#### 16 **Late Long-Term Timeframe**

17 Alternative 1A as a whole would affect 2,215 acres of roosting habitat (Table 12-1A-61). Because the  
18 majority of affected acres would convert agricultural land to natural communities with higher  
19 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
20 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
21 in the late long-term.

22 Implementation of Alternative 1A in the late long-term would result in an overall benefit to special-  
23 status bats within the study area through protection and restoration of approximately 142,200 acres  
24 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
25 protect the highest quality natural communities and covered species habitat in the Plan Area to  
26 optimize the ecological value of the reserve system for conserving covered species and native  
27 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
28 community acreage targets. Achieving this objective is intended to protect and restore natural  
29 communities, species-specific habitat elements, and species diversity on a landscape-scale.,  
30 Achieving this objective is also intended to conserve representative natural and seminatural  
31 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
32 ecosystem function, and biological diversity.

33 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
34 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
35 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
36 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
37 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored  
38 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
39 higher function because the production of flying insect prey species is expected to be greater in  
40 restored wetlands and uplands on which application of pesticides would be reduced relative to  
41 affected agricultural habitats.

42 Should any of the special-status bat species be detected roosting in the study area, construction of  
43 water conveyance facilities and restoration activities would have an adverse effect on roosting



1 special-status bats. Noise and visual disturbances and the potential for injury or mortality of  
2 individuals associated within implementation of the restoration activities on active roosts would be  
3 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*  
4 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently  
5 offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

6 **NEPA Effects:** Because the BDCP has committed to protecting the acreage required to meet the  
7 typical mitigation ratios described above, the losses of roosting and foraging habitat for special-  
8 status bats associated with implementing Alternative 1A are not expected to result in substantial  
9 adverse effects on special-status bats, either directly or through habitat modifications, and would  
10 not result in a substantial reduction in numbers or a restriction in the range of special-status bats.  
11 With habitat protection and restoration associated with the conservation components, guided by  
12 landscape-scale goals and objectives and by AMM1–AMM6, and AMM10, and with implementation of  
13 Mitigation Measure BIO-166, loss of habitat and potential mortality under Alternative 1A as a whole  
14 would not have an adverse effect on special-status bats.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because water conveyance facilities construction is being evaluated at the project level, the near-  
18 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
19 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
20 be less than significant under CEQA. Because the majority of affected acres would convert  
21 agricultural land to natural communities with higher potential foraging and roosting value, such as  
22 riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses only on  
23 losses to roosting habitat for CM1, CM2, and CM4 in the near-term.

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25 status bats in the near-term as a result of implementing CM1 (433 acres roosting habitat), CM2 (256  
26 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in  
27 the late long-term. Most of the roosting habitat losses would occur in an valley/foothill riparian.

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29 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
30 natural community. Using these ratios would indicate that 1,124 acres of riparian habitat should be  
31 restored and 1,124 acres of riparian habitat should be protected.

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33 bats within the study area through protection and restoration of their foraging and roosting habitats  
34 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
35 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities  
36 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
37 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
38 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
39 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
40 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored  
41 habitats are expected to be of higher function because the production of flying insect prey species is  
42 expected to be greater in restored wetlands and uplands on which application of pesticides would  
43 be reduced relative to affected agricultural habitats. Conservation components in the near-term

1 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1A. In  
2 addition, activities associated with natural communities enhancement and protection and with  
3 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
4 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
5 described below, requires preconstruction surveys to reduce these impacts to less than significant  
6 under CEQA.

7 The permanent loss of roosting habitat from Alternative 1A would be mitigated through  
8 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact  
9 under CEQA on roosting special-status bats, either directly or through habitat modifications and no  
10 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also  
11 contains commitments to implement AMM1-6 and AMM10. These AMMs include elements that  
12 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work  
13 areas and storage sites. BDCP. BDCP Appendix 3.C describes the AMMs in detail.

#### 14 ***Late Long-Term Timeframe***

15 Alternative 1A as a whole would affect 2,215 acres of roosting habitat (Table 12-1A-61). Because the  
16 majority of affected acres would convert agricultural land to natural communities with higher  
17 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
18 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
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20 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
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22 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
23 protect the highest quality natural communities and covered species habitat in the Plan Area to  
24 optimize the ecological value of the reserve system for conserving covered species and native  
25 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
26 community acreage targets. Achieving this objective is intended to protect and restore natural  
27 communities, species-specific habitat elements, and species diversity on a landscape-scale.,  
28 Achieving this objective is also intended to conserve representative natural and seminatural  
29 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
30 ecosystem function, and biological diversity.

31 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
32 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
33 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
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35 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored  
36 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
37 higher function because the production of flying insect prey species is expected to be greater in  
38 restored wetlands and uplands on which application of pesticides would be reduced relative to  
39 affected agricultural habitats.

40 Should any of the special-status bat species be detected roosting in the study area, construction of  
41 water conveyance facilities and restoration activities would have an adverse effect on roosting  
42 special-status bats. Noise and visual disturbances and the potential for injury or mortality of  
43 individuals associated within implementation of the restoration activities on active roosts would be  
44 minimized with implementation of Mitigation Measure BIO-166. Conservation components would

1 sufficiently offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and  
2 CM5.

3 The permanent loss of roosting habitat from Alternative 1A would be mitigated through  
4 implementation of Mitigation Measure BIO-166, which would ensure that there is no significant  
5 impact on roosting special-status bats, either directly or through habitat modifications, and that  
6 there is no substantial reduction in numbers or a restriction in the range of special-status bats.  
7 Therefore, Alternative 1A would not result in a significant impact on special-status bats under CEQA.

8 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
9 **Implement Protective Measures**

10 The following measure was designed to avoid and minimize adverse effects on special-status  
11 bats. However, baseline data are not available or are limited on how bats use the study area, and  
12 on individual numbers of bats and how they vary seasonally. Therefore, it is difficult to  
13 determine if there would be a substantial reduction in species numbers. Bat species with  
14 potential to occur in the study area employ varied roost strategies, from solitary roosting in  
15 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and  
16 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest  
17 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include  
18 these components.

- 19 • Identification of potential roosting habitat within project area.
- 20 • Daytime search for bats and bat sign in and around identified habitat.
- 21 • Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or  
22 active full-spectrum acoustic monitoring where species identification is sought.
- 23 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from  
24 dusk to dawn over multiple nights.
- 25 • Additional on-site night surveys as needed following passive acoustic detection of special  
26 status bats to determine nature of bat use of the structure in question (e.g., use of structure  
27 as night roost between foraging bouts).
- 28 • Qualified biologists will have knowledge of the natural history of the species that could  
29 occur in the study area and experience using full-spectrum acoustic equipment. During  
30 surveys, biologists will avoid unnecessary disturbance of occupied roosts.

31 ***Preconstruction Bridges and Other Structure Surveys***

32 Before work begins on the bridge/structure, qualified biologists will conduct a daytime search  
33 for bat sign and evening emergence surveys to determine if the bridge/structure is being used  
34 as a roost. Biologists conducting daytime surveys would listen for audible bat calls and would  
35 use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes,  
36 and other bridge features that could house bats. Bridge surfaces and the ground around the  
37 bridge/structure would be surveyed for bat sign, such as guano, staining, and prey remains.

38 Evening emergence surveys will consist of at least one biologist stationed on each side of the  
39 bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after  
40 sunset for a minimum of two nights within the season that construction would be taking place.  
41 Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence

1 surveys to assist in species identification. All emergence surveys would be conducted during  
2 favorable weather conditions (calm nights with temperatures conducive to bat activity and no  
3 precipitation predicted).

4 Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in  
5 determining species present. A minimum of four nights of acoustic monitoring surveys will be  
6 conducted within the season that the construction would be taking place. If site security allows,  
7 detectors should be set to record bat calls for the duration of each night. To the extent possible,  
8 all monitoring will be conducted during favorable weather conditions (calm nights with  
9 temperatures conducive to bat activity and no precipitation predicted). The biologists will  
10 analyze the bat call data using appropriate software and prepare a report with the results of the  
11 surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost,  
12 biologists will conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to  
13 determine if the bridge is serving as a colonial night roost.

14 If suitable roost structures will be removed, additional surveys may be required to determine  
15 how the structure is used by bats, whether it is as a night roost, maternity roosts, migration  
16 stopover, or for hibernation.

#### 17 ***Preconstruction Tree Surveys***

18 If tree removal or trimming is necessary, qualified biologists will examine trees to be removed  
19 or trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities,  
20 basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be  
21 identified and the area around these features searched for bats and bat sign (guano, culled insect  
22 parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should  
23 be considered potential habitat for solitary foliage roosting bat species.

24 If bat sign is detected, biologists will conduct evening visual emergence survey of the source  
25 habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two  
26 nights within the season that construction would be taking place. Methodology should follow  
27 that described above for the bridge emergence survey.

28 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector  
29 will be used to assist in determining species present. These surveys would be conducted in  
30 coordination with the acoustic monitoring conducted for the bridge/structure.

#### 31 ***Protective Measures for Bats using Bridges/Structures and Trees***

32 Avoidance and minimization measures may be necessary if it is determined that bats are using  
33 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during  
34 acoustic monitoring. Appropriate measures will be determined in coordination with CDFW and  
35 may include measures listed below.

- 36 • Disturbance of the bridge will be avoided between April 15 and September 15 (the  
37 maternity period) to avoid impacts on reproductively active females and dependent young.
- 38 • Installation of exclusion devices from March 1 through April 14 or September 15 through  
39 October 30 to preclude bats from occupying the bridge during construction. Exclusionary  
40 devices will only be installed by or under the supervision of an experienced bat biologist.

- 1       ● Tree removal will be avoided between April 15 and September 15 (the maternity period) to  
2       avoid impacts on pregnant females and active maternity roosts (whether colonial or  
3       solitary).
- 4       ● All tree removal will be conducted between September 15 and October 30, which  
5       corresponds to a time period when bats would not likely have entered winter hibernation  
6       and would not be caring for flightless young. If weather conditions remain conducive to  
7       regular bat activity beyond October 30<sup>th</sup>, later tree removal may be considered in  
8       consultation with CDFW.
- 9       ● Trees will be removed in pieces, rather than felling the entire tree.
- 10      ● If a maternity roost is located, whether solitary or colonial, that roost will remain  
11      undisturbed with a buffer as determined in consultation with CDFW until September 15 or  
12      until a qualified biologist has determined the roost is no longer active.
- 13      ● If a non-maternity roost is found, that roost will be avoided and an appropriate buffer  
14      established in consultation with CDFW. Every effort should be made to avoid the roost, as  
15      methods to evict bats from trees are largely untested. However, if the roost cannot be  
16      avoided, eviction will be attempted and procedures designed in consultation with CDFW to  
17      reduce the likelihood of mortality of evicted bats. In all cases:
  - 18      ○ Eviction would not occur before September 15<sup>th</sup> and would match the timeframe for tree  
19      removal approved by CDFW.
  - 20      ○ Qualified biologists would carry out or oversee the eviction tasks and would monitor the  
21      tree trimming/removal.
  - 22      ○ Eviction would take place late in the day or in the evening to reduce the likelihood of  
23      evicted bats falling prey to diurnal predators.
  - 24      ○ Eviction would take place during weather and temperature conditions conducive to bat  
25      activity.
  - 26      ○ Special-status bat roosts would not be disturbed.
- 27      Eviction procedures may include but are not limited to:
  - 28      ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent  
29      mitigation requirements. Relevant data may include the species, sex, reproductive status  
30      and/or number of bats using the roost, and roost conditions themselves such as  
31      temperature and dimensions. Surveys may include visual emergence, night vision,  
32      acoustic, and/or capture.
  - 33      ○ Structural changes may be made to the roost, performed without harming bats, such  
34      that the conditions in the roost are undesirable to roosting bats and the bats leave on  
35      their own (e.g., open additional portals so that temperature, wind, light and  
36      precipitation regime in the roost change).
  - 37      ○ Non-injurious harassment at the roost site to encourage bats to leave on their own, such  
38      as ultrasound deterrents or other sensory irritants.
- 39      ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed  
40      roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and  
41      several minutes should pass before felling trees or trimming limbs to allow bats time to

1 arouse and leave the tree. The biologists should search downed vegetation for dead and  
2 injured bats. The presence of dead or injured bats would be reported to CDFW.

3 Compensatory mitigation for the loss of roosting habitat will also be determined through  
4 consultation with CDFW and may include the construction and installation of suitable  
5 replacement habitat onsite. Depending on the species and type of roost lost, various roost  
6 replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting  
7 cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural  
8 habitat onsite is generally preferable to artificial.

9 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as  
10 possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat  
11 may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat  
12 when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona  
13 Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine  
14 trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record  
15 but information is mounting on how to create successful houses. There is no single protocol or  
16 recipe for bat-house success. Careful study of the roost requirements of the species in question;  
17 the particular conditions at the lost roost site including temperature, orientation of the  
18 openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase  
19 the chances of designing a successful replacement.

20 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat  
21 activity has been positively correlated with increased vegetation and tree growth, canopy  
22 complexity and restoration acreage at cottonwood-wouldow restoration sites along the Lower  
23 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide  
24 a wider range of bat species with preferred roost types, including both foliage-roosting and  
25 crevice-/cavity-roosting bats.

## 26 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

27 Construction activities associated with water conveyance facilities, conservation components and  
28 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
29 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
30 postconstruction disturbances and noise with localized effects on special-status bats and their  
31 roosting habitat over the term of the BDCP.

32 Water conveyance facilities operations and maintenance activities would include vegetation and  
33 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
34 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
35 activities are not expected to remove special-status bat habitat, operation of equipment could  
36 disturb small areas of vegetation around maintained structures and could result in disturbances to  
37 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting  
38 Bats and Implement Protective Measures*, is available to address these potential effects.

39 Increased exposure to methylmercury associated with tidal natural communities restoration could  
40 indirectly affect special-status bat species. *CM12 Methylmercury Management* describes the process  
41 by which tidal natural communities restoration may increase methyl mercury levels in wetlands in  
42 the study area. Mercury has been found in high concentrations in some bat species, such as the  
43 Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid

1 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are  
2 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP  
3 tidal natural communities restoration.

4 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would  
5 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or  
6 through habitat modifications. This mitigation measure would also avoid and minimize effects that  
7 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,  
8 the indirect effects of Alternative 1A would not have an adverse effect on special-status bats.

9 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as  
10 well as construction-related noise and visual disturbances could have a significant impact on  
11 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure  
12 BIO-166 would reduce this impact to a less-than-significant level and ensure Alternative 1A would  
13 not result in a substantial reduction in numbers or a restriction in the range of species.

14 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
15 **Implement Protective Measures**

16 See Mitigation Measure BIO-166 under Impact BIO-166.

17 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**  
18 **Implementation of Conservation Components**

19 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
20 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study  
21 area (Table 12-1A-61).

22 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of  
23 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-1A-61).  
24 Potential roosting trees are likely to be retained within seasonally flooded areas, although high  
25 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging  
26 habitat for the species. The overall effect of seasonal inundation in existing riparian natural  
27 communities may instead be beneficial. Historically, flooding was the main natural disturbance  
28 regulating ecological processes in riparian areas, and flooding promotes the germination and  
29 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas  
30 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat  
31 for special-status bats that use riparian habitats.

32 **NEPA Effects:** The periodic losses of roosting and foraging habitat for special-status bats associated  
33 with implementing Alternative 1A are not expected to result in substantial adverse effects on  
34 special-status bats, either directly or through habitat modifications and would not result in a  
35 substantial reduction in numbers or a restriction in the range of special-status bats. Mitigation  
36 Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective*  
37 *Measures*, is available to address any effects of periodic inundation on special-status bats and  
38 roosting habitat. Therefore, Alternative 1A would not adversely affect the species.

39 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would  
40 periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact  
41 of periodic inundation on special-status bats would be mitigated through implementation of  
42 Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement*

1 *Protective Measures*, which would ensure there is no significant impact on roosting special-status  
2 bats, either directly or through habitat modifications and no substantial reduction in numbers or a  
3 restriction in the range of special-status bats.

4 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
5 **Implement Protective Measures**

6 See Mitigation Measure BIO-166 under Impact BIO-166.

7 **Plant Species**

8 **Vernal Pool Plants**

9 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in  
10 the study area (Tables 12-2, 12-3, summarized in Table 12-1A-62). The vernal pool habitat model  
11 used for the impact analysis was based on vegetation types and associations from various data sets  
12 which were used to create maps showing the distribution of vernal pool habitat in the study area  
13 according to three habitat types in which these species are known to occur, including vernal pool  
14 complex, degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool complex  
15 habitat consists of vernal pools and uplands that display characteristic vernal pool and swale visual  
16 signatures that have not been significantly impacted by agricultural or development practices.  
17 Degraded vernal pool complex habitat consists of habitat that ranges from areas with vernal pool  
18 and swale visual signatures that display clear evidence of significant disturbance due to plowing,  
19 discing, or leveling to areas with clearly artificial basins such as shallow agricultural ditches,  
20 depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in the  
21 degraded vernal pool complex are inundated during the wet season and may have historically been  
22 located in or near areas with natural vernal pool complex, they may support individuals or small  
23 populations of species that are found in vernal pools and swales. However, they do not possess the  
24 full complement of ecosystem and community characteristics of natural vernal pools, swales and  
25 their associated uplands and they are generally ephemeral features that are eliminated during the  
26 course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was  
27 included in the model because alkaline vernal pools are also present in some areas mapped as alkali  
28 seasonal wetland.

29 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat  
30 affinities, and because vernal pool habitat within the study area is highly heterogeneous with  
31 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly  
32 overestimates the extent of habitat in the study area occupied by each species. However, the vernal  
33 pool habitat model is likely to encompass all or most of the potential area within which special-  
34 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent  
35 of occupied habitat or to underestimate the effects of Alternative 1A.

36 Full implementation of Alternative 1A would include the following conservation actions over the  
37 term of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3, Section 3.3, *Biological Goals*  
38 *and Objectives*).

- 39 • Protect two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills or  
40 Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).



- Maintain no net loss of Heckard’s peppergrass in Conservation Zones 1, 8, or 11 within restoration sites or within the area of affected tidal range of restoration projects (Objective VPP1.2, associated with CM3 and CM9).

The construction and restoration activities covered under Alternative 1A could have impacts on special-status vernal pool plants. No modeled habitat and no known occurrences of the 17 vernal pool plants are within the proposed footprint for the Alternative 1A water conveyance facilities. No known occurrences of the 17 vernal pool plants are within the hypothetical footprint for restoration activities; however, modeled vernal pool habitat is present within the tidal restoration footprint. Table 12-1A-62 summarizes the acreage of modeled vernal pool habitat in the study area, the number of occurrences of each special-status vernal pool plant in the study area, and potential impacts.

**Table 12-1A-62. Summary of Impacts on Vernal Pool Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Vernal pool complex	9,557	2	0	0	Habitat loss from construction of water conveyance facilities and tidal habitat restoration
Degraded vernal pool complex	2,576	373	0	0	Habitat loss from construction of water conveyance facilities and tidal habitat restoration
Alkali Seasonal Wetland	188	0	0	0	None
<b>Total</b>	<b>12,321</b>	<b>375</b>	<b>0</b>	<b>0</b>	Habitat loss from construction of water conveyance facilities and tidal habitat restoration
<b>Covered Species</b>					
Alkali milk-vetch	0	0	16	0	None
Dwarf downingia	0	0	12	0	None
Boggs Lake hedge-hyssop	0	0	1	0	None
Legenere	0	0	8	0	None
Heckard’s peppergrass	0	0	4 <sup>a</sup>	0	None
<b>Noncovered Species</b>					
Ferris’ milk-vetch	0	0	6	0	None
Vernal pool smallscale	0	0	2	0	None
Hogwallow starfish	0	0	0	0	None
Ferris’ goldfields	0	0	4	0	None
Contra Costa goldfields	0	0	7	0	None
Cotula-leaf navarretia	0	0	5	0	None

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Baker's navarretia	0	0	3	0	None
Colusa grass	0	0	1	0	None
Bearded popcorn-flower	0	0	5	0	None
Delta woolly marbles	0	0	3	0	None
Saline clover	0	0	9	0	None
Solano grass	0	0	1	0	None

<sup>a</sup> One additional occurrence is in alkali seasonal wetlands.

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### Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants

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Alternative 1A covered activities could affect habitat for special-status vernal pool plants. The individual effects of each relevant conservation measure are addressed below. A summary statement of the combined impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

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- *CM1 Water Facilities and Operations*: Three acres of modeled habitat for covered vernal pool species are present within the proposed footprint for the Alternative 1A water conveyance facilities. No known occurrences of the 17 vernal pool plants are within the proposed footprint for the Alternative 1A water conveyance facilities. However, under Alternative 1A, construction and operation of the water conveyance facilities could affect undiscovered occurrences of the five covered vernal pool plants or the 12 noncovered special-status plants.

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- *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known occurrences of special-status vernal pool plant species are within the hypothetical footprint for construction or operation of the Yolo Bypass fisheries enhancements. Construction and operation of the Yolo Bypass Fisheries enhancements would not affect the 17 covered or noncovered vernal pool plants.

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- *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered vernal pool plants by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1). The protected vernal pool habitat would be managed and enhanced to sustain populations of native vernal pool species. These benefits also would accrue to any noncovered vernal pool plants occurring in the protected vernal pool complex.

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- *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the inundation of 372 acres of vernal pool complex and would, therefore, potentially affect special-status vernal pool plants. However, most of this habitat (370 acres) consists of degraded vernal pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of critical habitat for Contra Costa goldfields could be affected. No known occurrences of covered and noncovered vernal pool plants would be affected.

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- *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of special-status vernal pool plants are present within areas proposed for floodplain restoration. Therefore, floodplain restoration and construction of new floodplain levees would have no impacts on covered and noncovered vernal pool plants.

- 1       • *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status  
2       vernal pool plants are present within areas proposed for channel margin habitat enhancement.  
3       Therefore, channel margin habitat enhancement would have no impacts on covered and  
4       noncovered vernal pool plants.
- 5       • *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-  
6       status vernal pool plants are present within areas proposed for riparian habitat enhancement.  
7       Therefore, riparian habitat enhancement would have no impacts on covered and noncovered  
8       vernal pool plants.
- 9       • *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat  
10       includes grassland matrix within which the vernal pools occur, grassland restoration activities  
11       would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
12       that are not included within vernal pool complex habitat. Therefore, grassland communities  
13       restoration would have no impacts on covered and noncovered vernal pool plants.
- 14       • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen  
15       circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be  
16       implemented to compensate for that loss. Because vernal pool complex restoration would focus  
17       on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the  
18       likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool  
19       restoration could adversely affect remnant populations of special-status vernal pool plants or  
20       potentially affect vernal pool habitat adjacent to the restoration areas.
- 21       • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
22       conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool  
23       habitat and would have no impacts on covered and noncovered vernal pool plants.
- 24       • *CM22 Avoidance and Minimization Measures*: Effects on covered vernal pool plants potentially  
25       resulting from implementation of CM4 would be avoided or minimized through *AMM11 Covered*  
26       *Plant Species*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM12 Vernal*  
27       *Pool Crustaceans*, and *AMM37 Recreation*. AMM11 prohibits ground disturbance or hydrologic  
28       disturbance within 250 feet of existing vernal pools. In addition, AMM11 specifies that  
29       individual projects be designed to avoid critical habitat for listed plant and wildlife vernal pool  
30       species. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than 10  
31       wetted acres and the indirect effect to no more than 20 wetted acres through the life of the Plan.  
32       AMM12 also requires that tidal natural communities restoration or other ground-disturbing  
33       covered activities in Conservation Zones 1 and 11 not result in the adverse modification of  
34       primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy  
35       shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat  
36       for Contra Costa goldfields where it overlaps with critical habitat for these vernal pool  
37       crustaceans. AMM37 requires that new recreation trails avoid populations of covered vernal  
38       pool plants.

39       In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This  
40       includes protecting two occurrences of alkali milkvetch (Objective VPP1.1) and requiring no net loss  
41       of Heckard's peppergrass (Objective VPP1.2).

42       In summary, no adverse effects on covered special-status vernal pool plants would be expected  
43       under Alternative 1A. No known occurrences of 17 special-status vernal pool plants would be  
44       affected. Beneficial effects on special-status vernal pool plants could occur by protecting 600 acres

1 of vernal pool complex in CZs 1, 8, and 11 and by protecting occurrences of alkali milk-vetch.  
2 Because conservation measures that protect covered species do not apply to noncovered species,  
3 one occurrence of bearded popcornflower could be adversely affected.

4 The GIS analysis estimated that up to 375 acres of vernal pool complex could be adversely affected  
5 by covered activities under Alternative 1A. However, the actual effect on habitat for special-status  
6 vernal pool plants is expected to be much less than the estimated impact because the BDCP limits  
7 the total loss of wetted vernal pool habitat resulting from specific projects to 10 acres  
8 (approximately 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed  
9 restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5  
10 acres of vernal pool complex restoration would be required to compensate for the loss of modeled  
11 habitat for special-status vernal pool plants (Objective VPNC1.2, associated with CM9). This would  
12 be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts.  
13 The limitation on the loss of wetted vernal pool habitat will constrain the implementation of tidal  
14 restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of  
15 restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

16 **NEPA Effects:** The loss of modeled habitat for vernal pool plant species would be minimized by  
17 AMM12 and offset through CM9. Therefore, Alternative 1A would not result in adverse effects on  
18 covered and noncovered vernal pool plant species.

19 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plants would be offset through  
20 restoration, and because impacts on occurrences of covered vernal pool plants would be avoided,  
21 implementation of Alternative 1A would not result in a reduction in the range or numbers of 17  
22 covered and noncovered special-status vernal pool plants in the study area. This impact would be  
23 less than significant, and no mitigation is required.

#### 24 **Alkali Seasonal Wetland Plants**

25 Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area  
26 (Tables 12-2, 12-3, summarized in Table 12-1A-63). Alkali seasonal wetland habitat was modeled  
27 separately for four covered plant species occurring in seasonal alkali wetlands.

28 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin  
29 spearscale habitat in the study area according to the species' preferred habitat types, intersected  
30 with soil series and slope position. Historical and current records of San Joaquin spearscale in the  
31 Plan Area indicate that its current distribution is limited to alkaline soil areas with shallow basin or  
32 swale microtopography along the western border. The vegetation cover of the alkaline soils is  
33 typically a combination of alkaline soil-adapted species and annual grasses, including annual  
34 ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal  
35 wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays  
36 or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level  
37 terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are  
38 present. Because some of the soil series with which San Joaquin spearscale is associated can occur  
39 on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils  
40 occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the  
41 species' habitat requirements, such as modeled habitat polygons falling on leveled or developed  
42 lands, were removed from the model.

1 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and  
2 playa pools located on alluvium associated with the Montezuma Block along the western boundary  
3 of the study area or on alluvium associated with tertiary formations located along the southwest  
4 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these  
5 geologic units were selected and truncated at the point at which they encountered the upper  
6 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of  
7 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the  
8 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed  
9 from the model.

10 The habitat model for heartscale was based on the species distribution in the study area (Solano and  
11 Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat  
12 was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County  
13 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and  
14 vernal pool complex natural communities. The model excluded areas that have been developed or  
15 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

16 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,  
17 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,  
18 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San  
19 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive  
20 agriculture was classified as annual grassland were manually deleted from the area of predicted  
21 habitat. Additionally, other areas of potential habitat that have been developed were also manually  
22 deleted.

23 Full implementation of Alternative 1A would include the following conservation actions over the  
24 term of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3, Section 3.3,  
25 *Biological Goals and Objectives*).

- 26 • Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600  
27 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland  
28 natural community protected under Objective GNC1.1, protect 75 acres of suitable brittlescale  
29 habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11 (Objective  
30 BRIT/HART/SJSC1.1, associated with CM3).
- 31 • Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones  
32 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).

33 Modeled habitat for Delta button-celery would be adversely affected by construction of the  
34 Alternative 1A water conveyance facilities. One population of crownscale also would be adversely  
35 affected by construction of the water conveyance facilities. Modeled habitat for brittlescale and  
36 heartscale could be adversely affected by tidal habitat restoration. One occurrence each of San  
37 Joaquin spearscale and Heckard's peppergrass could be affected by tidal habitat restoration. No  
38 adverse effects on palmate-bracted bird's-beak or recurved larkspur would be expected. Table 12-  
39 1A-63 summarizes the acreage of modeled alkali seasonal wetland habitat in the study area and the  
40 number of occurrences of each special-status alkali seasonal wetland plant in the study area.

1 **Table 12-1A-63. Summary of Impacts on Seasonal Alkali Wetland Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
San Joaquin spearscale modeled habitat	14,933	748	0	0	Habitat loss from construction of water conveyance facilities, construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration levee construction
Brittlescale modeled habitat	451	4	0	0	Habitat loss from tidal habitat restoration
Heartscale modeled habitat	6,528	306	0	0	Habitat loss from tidal habitat restoration
Delta button-celery modeled habitat	3,361 <sup>a</sup>	18	0	0	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	72	0	0	Habitat loss from tidal restoration and Yolo Bypass fisheries enhancements
<b>Covered Species</b>					
San Joaquin spearscale	0	0	19	1	Population loss from tidal habitat restoration
Brittlescale	0	0	8	0	None
Heartscale	0	0	3	0	None
Delta button celery	0	0	1 <sup>b</sup>	0	None
Heckard's peppergrass	0	0	1 <sup>c</sup>	1	Population loss from tidal habitat restoration
<b>Noncovered Species</b>					
Crownscale	0	0	17	1	Population loss from construction of water conveyance facilities
Palmate-bracted bird's-beak	0	0	1	0	None
Recurved larkspur	0	0	4	0	None
<sup>a</sup> A portion of this acreage consists of riparian habitat. <sup>b</sup> A second occurrence in study area is in riparian habitat. <sup>c</sup> Two additional occurrences of Heckard's peppergrass are associated with vernal pools.					

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3 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

4 Alternative 1A would have adverse effects on modeled habitat for San Joaquin spearscale,  
 5 brittlescale, heartscale, and Delta button-celery. It would also have adverse effects on occurrences of  
 6 heartscale, Heckard's peppergrass, and crownscale.

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

- 4 • *CM1 Water Facilities and Operations*: Under Alternative 1A, construction of the Byron Tract  
5 Forebay would permanently remove 69 acres of modeled habitat for San Joaquin spearscale and  
6 21 acres of modeled habitat for Delta button-celery. This could be an adverse effect, depending  
7 on whether or not the affected modeled habitat is actually occupied by the species. Modeled  
8 habitat is assumed to encompass all potential habitat for a species and may therefore  
9 overestimate the area actually occupied. Known occurrences of San Joaquin spearscale near the  
10 forebay do not appear to be affected by facilities construction. Delta button-celery is not known  
11 to occur in CZ 8; the nearest known occurrence, in CZ 9, would not be affected.

12 Construction of the water conveyance facilities would permanently remove 0.2 acre of habitat  
13 occupied by crownscale at the Byron Tract Forebay. Part of the occurrence would be removed,  
14 but most of the occurrence would not be directly affected. However, a reduction of the  
15 population size, both in area and number of individuals present, would be an adverse impact.

16 Construction of the water conveyance facilities would not affect brittlescale, heartscale,  
17 Heckard's peppergrass, palmate-bracted bird's-beak, or recurved larkspur.

- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
19 enhancements would permanently remove 56 acres of modeled habitat for San Joaquin  
20 spearscale. No known occurrences of San Joaquin spearscale would be affected. No modeled  
21 habitat and no known occurrences of the seven other alkali seasonal wetland plants are within  
22 the hypothetical footprint for construction or operation of the Yolo Bypass fisheries  
23 enhancements.

- 24 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit alkali  
25 seasonal wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation  
26 Zones 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and  
27 enhanced to sustain populations of native plant species.

- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration is expected to convert  
29 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.  
30 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale  
31 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat  
32 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP  
33 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat  
34 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of  
35 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is  
36 actually occupied by these species is not known; modeled habitat is assumed to encompass all  
37 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal  
38 habitat restoration could adversely affect an occurrence of Heckard's peppergrass at Hass  
39 Slough and an occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These  
40 occurrences are based on historic records, and the whether or not the populations still exist is  
41 not known. In each case, the loss of modeled habitat and occurrences for covered species would  
42 be adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved  
43 larkspur would not be affected by tidal habitat restoration.

- 1       • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
2 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. No known  
3 occurrences of San Joaquin spearscale would be affected. No other alkali seasonal wetland  
4 habitat or occurrences of special-status alkali seasonal wetland plants are present within areas  
5 proposed for floodplain restoration. Therefore, floodplain restoration and construction of new  
6 floodplain levees would have no impacts on covered and noncovered alkali seasonal wetland  
7 plants.
- 8       • *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-  
9 status alkali seasonal wetland plants are present within areas proposed for channel margin  
10 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts  
11 on covered and noncovered alkali seasonal wetland plants.
- 12       • *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences  
13 of special-status alkali seasonal wetland plants are present within areas proposed for riparian  
14 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on  
15 covered and noncovered alkali seasonal wetland plants.
- 16       • *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat  
17 includes the grassland matrix within which the wetlands occur, grassland restoration activities  
18 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
19 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities  
20 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
- 21       • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools  
22 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,  
23 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland  
24 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.  
25 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands from other CMs  
26 by restoring or creating 72 acres of alkali seasonal wetlands in Conservation Zones 1, 8, or 11 to  
27 achieve no net loss of this habitat.
- 28       • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
29 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali  
30 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal  
31 wetland plants.
- 32       • *CM22 Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland  
33 plants potentially resulting from implementation of CM1 and CM4 would be avoided or  
34 minimized through *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices*  
35 *and Monitoring*, and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would  
36 be performed during the planning phase of projects, and any impacts on populations of covered  
37 species would be avoided through project design or subsequently minimized through AMM2. In  
38 addition, AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of  
39 existing vernal pools, which would protect those species with modeled habitat that includes  
40 vernal pool complex. Occurrences of covered species in vernal pools near tidal wetlands would  
41 not be affected by tidal habitat restoration where critical habitat for vernal pool species is  
42 present and would be avoided under AMM11. AMM37 requires that new recreation trails avoid  
43 populations of covered alkali seasonal wetland plants.



1 In summary, only one known occurrence of a special-status alkali seasonal wetland species  
2 (crownscale) would be affected under Alternative 1A, although one historic occurrence of Heckard's  
3 peppergrass and one historic occurrence of San Joaquin spearscale could also be affected by tidal  
4 restoration activities, if those occurrences still exist. AMM11 would be implemented to avoid an  
5 adverse effect on Heckard's peppergrass and San Joaquin spearscale occurrences.

6 The primary effect of Alternative 1A on special-status alkali seasonal wetland plants would be the  
7 loss of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and Delta  
8 button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands. The  
9 actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat less  
10 than the estimated impact because some of this habitat is composed of vernal pool complex, and the  
11 BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of vernal  
12 pool complex) over the permit term (AMM12). Loss of modeled habitat would be compensated for  
13 by restoring or creating vernal pool complex, alkali seasonal wetlands, and grasslands, in proportion  
14 to the amount of each habitat removed. At the proposed restoration ratios of 1:1 (prior to impact)  
15 and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration  
16 would be required to compensate for the loss of modeled habitat composed of vernal pool complex  
17 (Objective VPNC1.2, associated with CM9). Approximately 72 acres of alkali seasonal wetlands  
18 would be restored (Objective ASWC1.2, associated with CM9). Loss of modeled habitat composed of  
19 grasslands would be compensated for by restoring grassland habitat on a 1:1 basis (Objective  
20 GNC1.1, associated with CM8). These compensation levels would be consistent with typical NEPA  
21 and CEQA project-level mitigation ratios for impacts on vernal pools, alkali seasonal wetlands, and  
22 grasslands.

23 The BDCP would have a small beneficial effect on special-status alkali seasonal wetland plants by  
24 protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific  
25 goal that 75 acres would be modeled habitat for brittlescale and heartscale (Objective  
26 BRIT/HART/SJSC1.1) and another goal that would protect 2 occurrences of San Joaquin spearscale  
27 (Objective BRIT/HART/SJSC1.2). The benefits of habitat protection and management also would  
28 accrue to any noncovered alkali seasonal wetland plants occurring in the protected habitat.

29 **NEPA Effects:** Under Alternative 1A, loss of modeled habitat for alkali seasonal wetland plant  
30 species would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland  
31 habitat (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of  
32 Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,  
33 these effects would not be adverse.

34 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would  
35 be offset through restoration, and because impacts on occurrences of covered alkali seasonal  
36 wetland plants would be avoided, impacts on alkali seasonal wetlands as a result of implementing  
37 Alternative 1A would not result in substantially reducing the number or restricting the range of five  
38 covered and two noncovered plant species. However, conservation measures that benefit or protect  
39 covered species do not apply to noncovered species, and portions of the crownscale population at  
40 Byron Tract Forebay would be lost, which would be a significant impact. Implementation of  
41 Mitigation Measure BIO-170, *Avoid, Minimize, or Compensate for Impacts on Noncovered Special-*  
42 *Status Plant Species*, would reduce this impact to a less-than-significant level.

1       **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
2       **Special-Status Plant Species**

3       DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize  
4       impacts on species that occur on project sites, and compensate for impacts on species. All  
5       impacts on federally listed noncovered species, diamond-petaled California poppy, or caper-  
6       fruited tropidocarpum shall be avoided. Impacts on other special-status plant species shall be  
7       avoided to the extent feasible, and any unavoidable impacts shall be compensated for.

- 8       ● DWR shall conduct surveys for the special-status plant species within and adjacent to all  
9       project sites. Special-status plant surveys required for project-specific permit compliance  
10      will be conducted during the planning phase to allow design of the individual restoration  
11      projects to avoid adverse modification of habitat for specified covered plants. The purpose  
12      of these surveys will be to verify that the locations of special-status plants identified in  
13      previous record searches or surveys are extant, identify any new special-status plant  
14      occurrences, and cover any portions of the project area not previously surveyed. The extent  
15      of mitigation of direct loss of or indirect effects on special-status plants will be based on  
16      these survey results.
- 17     ● All surveys shall be conducted by qualified biologists using the using *Guidelines for*  
18     *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*  
19     *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*  
20     *Impacts to Special Status Native Plant Populations and Natural Communities* (California  
21     Department of Fish and Game 2009) during the season that special-status plant species  
22     would be evident and identifiable, i.e., during their blooming season. Locations of special-  
23     status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 24     ● The construction monitoring plan for the protection of covered fish, wildlife, and plant  
25     species, prepared by DWR before implementing an approved project, will provide for  
26     construction activity monitoring in areas identified during the planning stages and  
27     species/habitat surveys as having noncovered special-status plant species.
- 28     ● Where surveys determine that a special-status plant species is present in or adjacent to a  
29     project site, direct and indirect impacts of the project on the species shall be avoided  
30     through the establishment of activity exclusion zones, within which no ground-disturbing  
31     activities shall take place, including construction of new facilities, construction staging, or  
32     other temporary work areas. Activity exclusion zones for special-status plant species shall  
33     be established around each occupied habitat site, the boundaries of which shall be clearly  
34     marked with standard orange plastic construction exclusion fencing or its equivalent. The  
35     establishment of activity exclusion zones shall not be required if no construction-related  
36     disturbances will occur within 250 feet of the occupied habitat site. The size of activity  
37     exclusion zones may be reduced through consultation with a qualified biologist and with  
38     concurrence from USFWS or CDFW based on project site-specific conditions.
- 39     ● Where avoidance of impacts on a special-status plant species is infeasible, DWR will  
40     compensate for loss of individuals or occupied habitat of a special-status plant species  
41     through the acquisition, protection, and subsequent management in perpetuity of other  
42     existing occurrences at a 2:1 ratio (occurrences affected: occurrences preserved). DWR will  
43     provide detailed information to USFWS and CDFW on the location of the preserved  
44     occurrences, quality of the preserved habitat, feasibility of protecting and managing the  
45     areas in-perpetuity, responsible parties, and other pertinent information. If suitable

1 occurrences of a special-status plant species are not available for preservation, then the  
2 project shall be redesigned to remove features that would result in impacts on that species.

3 **Grassland Plants**

4 One covered plant and 11 noncovered special-status plants occur in grasslands in the study area  
5 (Tables 12-2, 12-3, summarized in Table 12-1A-64). The only covered plant species occurring in  
6 grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological  
7 features such as stream corridors on alluvium derived from the Montezuma Formation. Stream  
8 corridors (intermittent and perennial) that intersected these geologic units were selected and  
9 truncated at the point at which they encountered the upper elevation of intertidal marsh. The  
10 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated  
11 maximum extend of alluvium deposits in close proximity to the actual rivers/streams.

12 Full implementation of Alternative 1A would include the following conservation actions over the  
13 term of the BDCP to benefit covered grassland plants (BDCP Chapter 3, Section 3.3, *Biological Goals*  
14 *and Objectives*).

- 15 • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1  
16 and/or 11 (Objective CGB1.1, associated with CM3).
- 17 • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse  
18 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

19 Of 78,047 acres of grasslands in the study area, Alternative 1A would adversely affect 2,857 acres,  
20 including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of the plants, no known  
21 occurrences would be affected. One of five Parry’s rough tarplant occurrences in the study area  
22 could be adversely affected by Alternative 1A. Table 12-1A-64 summarizes the acreage of grassland  
23 habitat in the study area and the number of occurrences of each special-status grassland plant in the  
24 study area.

25 **Table 12-1A-64. Summary of Impacts on Grassland Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Carquinez goldenbush modeled habitat	1,346	4	0	0	Habitat loss from tidal habitat restoration
Grassland	78,047	2,857	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, floodplain restoration, and construction of conservation hatcheries facilities
<b>Covered Species</b>					
Carquinez goldenbush	0	0	10	1	Occurrence affected by tidal restoration

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Noncovered Species</b>					
Big tarplant	0	0	5	0	None
Round-leaved filaree	0	0	2	0	None
Pappose tarplant	0	0	7	0	None
Parry's rough tarplant	0	0	5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory	0	0	0	0	None
Diamond-petaled poppy	0	0	1	0	None
Stinkbells	0	0	1	0	None
Fragrant fritillary	0	0	4	0	None
Gairdner's yampah	0	0	0	0	None
Streamside daisy <sup>a</sup>	0	0	1	0	None
Caper-fruited tropidocarpum	0	0	8	0	None

<sup>a</sup> This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.

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### Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species

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Alternative 1A could have adverse effects on modeled habitat for Carquinez goldenbush. It could also have adverse effects on one occurrence of Carquinez goldenbush and one occurrence of Parry's rough tarplant. Although Alternative 1A would have no expected effects on known occurrences of the other special-status plant species that occur in grasslands, the loss of 2,857 acres of grassland would have the potential to adversely affect undocumented populations of special-status grassland species.

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

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- *CM1 Water Facilities and Operations*: No modeled habitat for Carquinez goldenbush and no known occurrences of the 12 special-status grassland plants are within the proposed footprint for the Alternative 1A water conveyance facilities. About 578 acres of grassland habitat would be affected by construction of the water conveyance facilities. However, this grassland habitat consists of small patches of herbaceous ruderal vegetation along levees that do not provide habitat for special-status grassland species. Therefore, under Alternative 1A, construction and operation of the water conveyance facilities would not affect the 12 special-status grassland plants.

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- *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Causeway (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is

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1 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet  
2 season, such as swales and seasonal wetlands. Increasing the frequency or duration of  
3 inundation may decrease the distribution in some areas by making some conditions too wet but  
4 would also expand the distribution into areas that may currently be too dry. Overall, changing  
5 the frequency and duration of inundation in the area of this occurrence should not result in a  
6 substantial change in the range of numbers of Parry's rough tarplant. Construction and  
7 operation of the Yolo Bypass Fisheries enhancements would not affect modeled habitat for  
8 Carquinez goldenbush or known occurrences of other special-status grassland plants.

- 9 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to preserve 8,000  
10 acres of grassland habitat, some of which may contain modeled habitat for Carquinez  
11 goldenbush. Protection of grassland habitat may also protect undiscovered occurrences of  
12 special-status plant species.
- 13 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently  
14 remove 1,122 acres of grassland habitat. Four acres of modeled habitat for Carquinez  
15 goldenbush along the eastern side of Suisun Marsh would be adversely affected, including part  
16 of one known occurrence. No other known occurrences of special-status grassland plants are  
17 within the hypothetical footprint of tidal restoration.
- 18 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would  
19 result in the loss of 85 acres of grassland habitat. Periodic inundation of the floodplain would  
20 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be  
21 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known  
22 occurrences of special-status grassland plants are present within areas proposed for floodplain  
23 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that  
24 does not support special-status grassland plants. Therefore, floodplain restoration and  
25 construction of new floodplain levees would have no impacts on covered and noncovered  
26 grassland plants.
- 27 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are  
28 present within areas proposed for channel margin habitat enhancement. Areas mapped as  
29 grassland along levees that would be affected by channel margin habitat enhancement are small  
30 patches of ruderal vegetation along levees that do not provide habitat for special-status  
31 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel  
32 margin habitat enhancement would have no impacts on covered and noncovered grassland  
33 plants.
- 34 • *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or  
35 known occurrences of special-status grassland plants are present within areas proposed for  
36 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts  
37 on covered and noncovered grassland plants.
- 38 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres  
39 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,  
40 cultivated land) or degraded grasslands. These areas do not currently provide habitat for  
41 special-status grassland plants. Therefore, grassland communities restoration would have no  
42 impacts on covered and noncovered grassland plants.
- 43 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes  
44 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored

1 would consist of areas of former vernal pool complex that have been leveled for cultivation,  
2 special-status grassland plants would not be present. Therefore, vernal pool complex  
3 restoration would not affect special-status grassland plants.

- 4 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
5 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland  
6 habitat and would have no impacts on covered and noncovered grassland plants.
- 7 • *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35  
8 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation  
9 that would not be likely to provide habitat for special-status grassland plants. Therefore,  
10 construction of the conservation hatcheries would not be expected to affect special-status  
11 grassland plants.
- 12 • *CM22 Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially  
13 resulting from implementation of CM4 and potential effects on undiscovered populations of  
14 special-status grassland plants would be avoided or minimized through *AMM11 Covered Plant*  
15 *Species*, *AMM2 Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*.  
16 Under AMM11, surveys for covered plant species would be performed during the planning  
17 phase of projects, and any impacts on populations of covered species would be avoided through  
18 project design or subsequently minimized through AMM2. AMM37 requires that new recreation  
19 trails would avoid populations of Carquinez goldenbush.

20 The primary effect of Alternative 1A on special-status grassland plants is the loss of potential (i.e.,  
21 modeled) habitat for Carquinez goldenbush, including part of one known occurrence. Under  
22 AMM11, the occurrence would be surveyed to establish the population limits and to redesign the  
23 project to avoid affecting the population, to the extent feasible. Protecting three unprotected  
24 occurrences of Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and  
25 enhancing occupied Carquinez goldenbush (Objective CGB1.2, associated with CM11) would  
26 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by  
27 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status  
28 grassland plants would be affected.

29 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting  
30 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit  
31 Carquinez goldenbush, the Plan proposes to protect at least three Carquinez goldenbush  
32 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied  
33 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with  
34 avoidance and minimization of impacts on species occurrences, would reduce any effects of  
35 Alternative 1A implementation on covered grassland plants to a level that is no longer adverse.

36 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset  
37 through CM3, CM8, and CM11. Therefore, implementation of Alternative 1B would result in no  
38 adverse effects on special-status grassland plants.

39 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be  
40 avoided or compensated for, Alternative 1A would not result in substantially reducing the numbers  
41 or restricting the range of one covered or 11 noncovered special-status grassland plants, and this  
42 impact would be less than significant. No mitigation is required.

1       **Valley/Foothill Riparian Plants**

2       Two covered plants and two noncovered special-status plants occur in valley/foothill riparian  
3       habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-1A-65). The valley/foothill  
4       riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area  
5       along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to  
6       Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough  
7       thistle is unknown; all known occurrences of these species within the area of modeled habitat are  
8       believed to be extirpated.

9       Full implementation of Alternative 1A would include the following conservation actions over the  
10      term of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3, Section 3.3,  
11      *Biological Goals and Objectives*).

- 12      ● Protect and enhance two occurrences of delta button celery. If occurrences are not found in the  
13      Plan Area, establish self-sustaining occurrences of delta button celery for a total of two  
14      occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in  
15      Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3  
16      and CM11).
- 17      ● Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan  
18      Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within  
19      the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in  
20      Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and  
21      CM11).

22      Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 1A would adversely  
23      affect 982 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres  
24      that are modeled habitat for slough thistle. Table 12-1A-65 summarizes the acreage of modeled  
25      habitat for Delta button-celery and slough thistle and the number of occurrences of each special-  
26      status grassland plant in the study area.

1 **Table 12-1A-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta button-celery modeled habitat	3,361 <sup>a</sup>	15	0	0	Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11	0	0	Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	892	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta button-celery	0	0	1 <sup>b</sup>	1	Occurrence potentially affected by floodplain restoration
Slough thistle	0	0	2	2	Occurrences potentially affected by floodplain restoration
<b>Noncovered Species</b>					
Northern California black walnut	0	0	1	0	None
Wright's trichocoronis	0	0	1	0	None
<sup>a</sup> A portion of this acreage consists of alkali seasonal wetland.					
<sup>b</sup> A second occurrence is in alkali seasonal wetland.					

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3 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

4 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or  
 5 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status  
 6 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough  
 7 thistle, which may support undocumented occurrences of these species, would be affected by  
 8 restoration of seasonally inundated floodplain.

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

- 12 • *CM1 Water Facilities and Operations*: Construction of the water conveyance facilities would  
 13 remove 86 acres of valley-foothill riparian habitat under Alternative 1A. However, no modeled  
 14 habitat and no known occurrences of the four special-status valley/foothill riparian plants are  
 15 within the proposed footprint for the Alternative 1A water conveyance facilities. Therefore,  
 16 under Alternative 1A, construction and operation of the water conveyance facilities would not  
 17 affect covered or noncovered special-status valley/foothill riparian plants.
- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries  
 19 enhancements would adversely affect 176 acres of valley/foothill riparian habitat. However, no



1 modeled habitat and no known occurrences of the four special-status valley/foothill riparian  
2 plants are within the hypothetical footprint for construction or operation of the Yolo Bypass  
3 fisheries enhancements. Therefore, construction and operation of the Yolo Bypass fisheries  
4 enhancements would not affect the covered or noncovered valley/foothill riparian plants.

- 5 ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to protect 552 acres  
6 of existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on  
7 special-status valley/foothill plants because no extant occurrences of special-status  
8 valley/foothill plants are present in the study area.
- 9 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres  
10 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of  
11 the four special-status valley/foothill riparian plants are within the hypothetical footprint for  
12 tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered  
13 valley/foothill riparian plants.
- 14 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
15 would remove about 78 acres of valley/foothill riparian habitat, including 15 acres of modeled  
16 habitat for Delta button-celery along the San Joaquin River in CZ 7. In addition, floodplain  
17 restoration would result in more frequent and longer inundation of 18 acres of modeled habitat  
18 for Delta button-celery in this area. The area affected contains one historic occurrence of Delta  
19 button celery. This occurrence is considered to be extirpated, because all habitat for Delta  
20 button-celery at his location has been converted to agriculture (California Department of Fish  
21 and Wildlife 2013). Therefore, Alternative 1A would not have an adverse effect on Delta button  
22 celery in CZ 7.

23 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of  
24 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.  
25 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or  
26 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not  
27 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not  
28 be compatible with restoring woody riparian habitat. In addition, establishing new populations  
29 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any  
30 beneficial effects on Delta button-celery would be speculative.

31 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough  
32 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat  
33 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50  
34 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled  
35 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences  
36 of slough thistle present in the study area, only one is considered to be extirpated (California  
37 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences  
38 of slough thistle. If occurrences are not found in the study area, then two self-sustaining  
39 occurrences of slough thistle would be established using locally-sourced genetic material for a  
40 total of two occurrences within the restored floodplain habitat on the main stem of the San  
41 Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new  
42 populations of slough thistle is an untried, unproven procedure and may not be feasible.  
43 Therefore, any beneficial effects on slough thistle would be speculative.

44 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could  
45 also be affected by floodplain restoration. The occurrence is presumed to be extant because the

1 presence or absence of suitable habitat has not been verified by field surveys (California  
2 Department of Fish and Wildlife 2013). However, the species has not been observed at this  
3 location for nearly a century, and habitat for Wright's trichocoronis, which would have been  
4 similar to that for Delta button celery and slough thistle, no longer appears to be present in  
5 aerial photographs of the area. Therefore, Alternative 1A would not be expected to have an  
6 adverse effect on Wright's trichocoronis.

- 7 ● *CM6 Channel Margin Habitat Enhancement*: No modeled habitat or occurrences of special-status  
8 valley/foothill riparian plants are present within areas proposed for channel margin habitat  
9 enhancement. Therefore, channel margin habitat enhancement would have no impacts on  
10 covered and noncovered valley/foothill riparian plants.
- 11 ● *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status  
12 valley/foothill riparian plants are present within areas proposed for riparian habitat  
13 restoration. Therefore, riparian habitat restoration would have no impacts on covered and  
14 noncovered valley/foothill riparian plants.
- 15 ● *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill  
16 riparian plants are present within areas proposed for grassland communities restoration.  
17 Therefore, grassland communities restoration would have no impacts on covered and  
18 noncovered valley/foothill riparian plants.
- 19 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-  
20 status valley/foothill riparian plants are present within areas proposed for vernal pool and  
21 alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration would  
22 have no impacts on covered and noncovered valley/foothill riparian plants.
- 23 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
24 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid  
25 valley/foothill riparian habitat and would have no impacts on covered and noncovered  
26 valley/foothill riparian plants.
- 27 ● *CM22 Avoidance and Minimization Measures* Effects on Delta button-celery and slough thistle  
28 potentially resulting from implementation of CM5 would be avoided or minimized though  
29 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*  
30 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the  
31 planning phase of projects, and any impacts on populations of covered species would be avoided  
32 through project design or subsequently minimized though AMM2.

33 Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in  
34 the study area, Alternative 1A is not expected to adversely affect any special-status valley/foothill  
35 riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected.  
36 Under AMM11, surveys for covered plants would be performed during the planning phase for  
37 floodplain restoration. If Delta button-celery or slough thistle were found to be present in the  
38 floodplain restoration area, then the project would be designed to avoid impacts on the populations.  
39 Therefore, Alternative 1A would not have an adverse effect on these species.

40 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of  
41 valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing  
42 new populations of Delta-button-celery or slough thistle would be a beneficial effect. However,  
43 establishing new populations is an untried, unproven procedure and may not be feasible.

1 **NEPA Effects:** Implementation of the BDCP under Alternative 1A would not have an adverse effect  
2 on special-status valley/foothill riparian plant species.

3 **CEQA Conclusion:** Alternative 1A would not result in a reduction in the range and numbers of  
4 covered and noncovered valley/foothill riparian plants. This impact would be less than significant.  
5 No mitigation is required.

### 6 **Tidal Wetland Plants**

7 Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study  
8 area (Tables 12-2, 12-3, summarized in Table 12-1A-66). Five tidal wetland habitat models were  
9 developed for the seven covered plant species occurring in tidal wetland habitat.

10 Modeled habitat for Mason's lilaopsis and Delta mudwort was mapped as areas within 10 feet (3  
11 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which  
12 was obtained from the BDCP geographic information system (GIS) vegetation data layer.

13 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area  
14 according to the species' habitat association with woody riparian habitat. The model selected Delta  
15 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to  
16 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits  
17 of the BDCP valley/foothill riparian natural community characterized by California dogwood, white  
18 alder, and arroyo willow.

19 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated  
20 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was  
21 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal  
22 perennial aquatic land cover types. The model used all tidal brackish emergent wetland polygons  
23 that were limited by specific vegetation units that are known to be closely associated with soft  
24 bird's-beak habitat.

25 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of  
26 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was  
27 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,  
28 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill  
29 riparian, or cultivated land habitats cover types. For brackish water areas in and near Suisun Marsh,  
30 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10  
31 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60  
32 centimeters) above intertidal.

33 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish  
34 emergent wetland polygons with the appropriate vegetation. This included vegetation units  
35 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

36 Full implementation of Alternative 1A would include the following conservation actions over the  
37 term of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3, Section 3.3, *Biological*  
38 *Goals and Objectives*).

- 39 • No net loss of Mason's lilaopsis and delta mudwort occurrences within restoration sites, or  
40 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated  
41 with CM4 and CM11),

- 1       • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites  
2       (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 3       • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded  
4       area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 5       • Complete seed banking of all existing Suisun Marsh populations and the representative genetic  
6       diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 7       • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection  
8       protocols (Objective SBB/SuT1.3, associated with CM11).
- 9       • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,  
10      associated with CM11).

11      Of 17,357 acres of tidal wetlands in the study area, Alternative 1A would affect 21 acres, including  
12      areas that are modeled habitat for Mason's lilaepsis, Delta mudwort, side-flowering skullcap, Delta  
13      tule pea, Suisun Marsh aster, soft bird's-beak, and Suisun thistle. Known occurrences of all of these  
14      species would be affected. In addition, four occurrences of Bolander's water-hemlock, a noncovered  
15      special-status plant, could be affected by tidal habitat restoration. Table 12-1A-66 summarizes the  
16      acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each  
17      special-status tidal wetland plants in the study area.

1 **Table 12-1A-66. Summary of Impacts on Tidal Wetland Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta mudwort/Mason's lilaopsis modeled habitat	6,081	48	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,497	10	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Soft bird's-beak modeled habitat	1,228	73	0	0	Habitat loss from tidal habitat restoration
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	3	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73	0	0	Habitat loss from tidal habitat restoration
Tidal brackish emergent wetland	8,501	0	0	0	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	21	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta mudwort	0	0	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	0	0	106	26	Occurrences affected by tidal habitat restoration
Mason's lilaopsis	0	0	181	23	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	0	0	12	0	None
Soft bird's-beak	0	0	13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster	0	0	164	26	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle	0	0	4	0	None
<b>Noncovered Species</b>					
Bolander's water hemlock	0	0	8	3	Occurrences affected by tidal habitat restoration

## 1 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

2 Alternative 1A would have adverse effects on tidal marsh special-status plants through  
3 implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation  
4 of CM3, CM6, CM7, CM8, and CM9.

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

- 8 • *CM1 Water Facilities and Operations*: Construction of the Alternative 1A water conveyance  
9 facilities would remove 34 acres of modeled habitat for delta mudwort and Mason's lilaepsis, 4  
10 acres of modeled habitat for side-flowering skullcap, and 2 acres of modeled habitat for Delta  
11 tulle pea and Suisun Marsh aster. The extent to which modeled habitat is actually occupied by  
12 these species is not known; however, 8 occurrences of Mason's lilaepsis, one occurrence of  
13 Suisun Marsh aster, and one occurrence of side-flowering skullcap in the study area could be  
14 affected by construction impacts. No known occurrences of the other covered and noncovered  
15 tidal wetland species would be affected by construction of the water conveyance facilities.
- 16 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
17 enhancements would remove 5 acres of modeled habitat for Mason's lilaepsis and delta  
18 mudwort. The extent to which modeled habitat is actually occupied by these species is not  
19 known; however, no known occurrences in the study area would be affected. Yolo Bypass  
20 operations would result in more frequent and longer inundation of 8 acres of modeled habitat  
21 Delta tulle peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster would be  
22 affected by Yolo Bypass operations. Habitat for these species is normally periodically inundated  
23 or saturated; therefore, a small increase in the frequency and duration of periodic inundation of  
24 the habitat would not be expected to have a substantial effect.
- 25 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes restoring or creating  
26 20 linear miles of transitional tidal areas within other natural communities that would be  
27 created or restored, including 6,000 acres of tidal brackish emergent wetland and 24,000 acres  
28 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these  
29 areas would be maintained and enhanced. The BDCP does not specifically propose to protect  
30 any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat  
31 or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal  
32 areas would be passively colonized by the covered tidal wetland plants.
- 33 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently  
34 remove 6 acres of modeled habitat for Mason's lilaepsis and Delta mudwort. Habitat loss would  
35 occur through conversion of the species habitat (at and immediately above the tidal zone in  
36 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled  
37 habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences  
38 of Mason's lilaepsis and 3 of 58 known occurrences of delta mudwort in the study area could be  
39 affected by tidal habitat restoration.

40 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.  
41 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not  
42 known; however, none of the 12 known occurrences in the study area would be affected.

43 Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tulle pea and Suisun  
44 Marsh aster. However, the BDCP would allow up to 50 acres of modeled habitat to be removed.

1 Habitat loss would result from conversion of the species habitat (at and immediately above the  
2 tidal zone in marshes and along rivers and streams) to inundated tidal habitat. The extent to  
3 which modeled habitat is actually occupied by the species is not known; however, 26 of 106  
4 known occurrences of Delta tule pea and 24 of 164 occurrences of Suisun Marsh aster in the  
5 study area would be affected.

6 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun  
7 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually  
8 occupied by the species is not known; however, seven of 13 known occurrences of soft bird's-  
9 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in  
10 the study area would be affected.

11 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-  
12 hemlock, a noncovered special-status species in the study area. Because Bolander's water-  
13 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site  
14 preparation, earthwork, and other site activities could adversely affect Bolander's water-  
15 hemlock through direct habitat removal.

- 16 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
17 would remove 3 acres of modeled habitat for Mason's lilaepsis and delta mudwort and 2 acres  
18 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the  
19 study area would be affected by floodplain restoration.

20 Floodplain restoration would result in more frequent and longer inundation of 2 acres of  
21 modeled habitat for Mason's lilaepsis and delta mudwort, 18 acres of modeled habitat for side-  
22 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No  
23 known occurrences of these species in the study area would be affected by periodic inundation  
24 of restored floodplain habitat. Habitat for these species is normally periodically inundated or  
25 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the  
26 habitat would not be expected to have a substantial effect.

- 27 • *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed  
28 separately from the effects of tidal habitat restoration. Channel margin enhancement would  
29 have adverse effects on tidal wetland plants through direct removal and habitat modification.  
30 However, it would have beneficial effects on these species by improving the habitat functions for  
31 these species as a result of riprap removal and creation of floodplain benches. Side-flowering  
32 skullcap would benefit from installation of large woody material, which it appears to colonize.
- 33 • *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to  
34 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat  
35 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out  
36 for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 37 • *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-  
38 status tidal wetland plants are present within areas proposed for grassland communities  
39 restoration. Therefore, grassland communities restoration would have no impacts on covered  
40 and noncovered tidal wetland plants.
- 41 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or  
42 occurrences of special-status tidal wetland plants are present within areas proposed for vernal  
43 pool complex restoration. Therefore, vernal pool complex restoration would have no impacts on  
44 covered and noncovered tidal wetland plants.

- 1 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
2 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland  
3 habitat and would have no impacts on covered and noncovered tidal wetland plants.
- 4 • *CM22 Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially  
5 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized  
6 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*  
7 *Monitoring*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*.  
8 Under AMM11, surveys for covered plant species would be performed during the planning  
9 phase of projects, and any impacts on populations of covered species would be avoided through  
10 project design or subsequently minimized through AMM2. In addition, AMM11 contains specific  
11 guidance to avoid adverse modification of any of the primary constituent elements for Suisun  
12 thistle or soft bird's-beak critical habitat. AMM30, which specifies that the alignment of  
13 proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats  
14 when siting poles and towers, to the maximum extent feasible, would avoid some impacts on  
15 Mason's lilaepsis and woolly rose-mallow. AMM37 requires that new recreation trails avoid  
16 populations of covered tidal wetland plants.

17 In summary, the GIS analysis indicates that Alternative 1A would result in the loss of modeled  
18 habitat for all of the covered species and result in adverse effects on known occurrences of most of  
19 the special-status plants occurring in tidal wetlands. However, the BDCP predicts that habitat  
20 restoration activities would greatly expand the amount of habitat available to each of these species,  
21 offsetting any potential loss of habitat or occurrences resulting from covered activities.

22 Delta mudwort could lose 48 acres of modeled habitat (0.8%), including all or part of three  
23 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
24 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
25 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement  
26 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
27 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also  
28 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
29 predicts that natural expansion of populations into the restored habitat would take place and result  
30 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
31 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
32 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

33 Mason's lilaepsis could lose 48 acres of modeled habitat (0.8%), including all or part of 23  
34 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
35 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
36 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement  
37 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
38 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also  
39 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
40 predicts that natural expansion of populations into the restored habitat would take place and result  
41 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
42 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
43 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

44 Delta tule pea could lose 3 acres of modeled habitat (0.05%), including all or part of 26 occurrences.  
45 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives



1 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
2 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian  
3 natural community restoration (CM7) will also consider the potential for creating habitat for Delta  
4 tule pea; creation of suitable habitat under these measures could also help offset this habitat loss.  
5 Although active restoration of this species is not proposed, the BDCP predicts that natural expansion  
6 of populations into the restored habitat would take place and result in no net loss of occurrences  
7 (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of affected  
8 occurrences and occurrences in reserve lands would be done to confirm that no net loss of  
9 occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

10 Suisun Marsh aster could lose 3 acres of modeled habitat (0.05%), including all or part of 26  
11 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
12 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
13 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin  
14 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the  
15 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these  
16 measures could also help offset this habitat loss. Although active restoration of this species is not  
17 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would  
18 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-  
19 implementation monitoring of affected occurrences and occurrences in reserve lands would be done  
20 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,  
21 associated with CM11).

22 All four of these species (Delta mudwort, Mason's lilaopsis, Delta tule pea, and Suisun Marsh aster)  
23 are widespread in the study area with many occurrences. Habitat modification and loss are the  
24 primary stressors that are responsible for their decline and that currently limit their distribution  
25 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these  
26 species would provide a reasonable expectation that the distribution and abundance of these  
27 species would also improve. Because a relatively small amount of modeled habitat would be  
28 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered  
29 activities on these species would be offset and that the overall effect of Alternative 1A on these  
30 species would not be adverse.

31 Side-flowering skullcap could lose 10 acres of modeled habitat (0.4%), but no occurrences would be  
32 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
33 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
34 side-flowering skullcap, which could offset this habitat loss. Channel margin enhancement (CM6)  
35 and riparian natural community restoration (CM7) will also consider the potential for creating  
36 habitat for side-flowering skullcap; creation of suitable habitat under these measures could also help  
37 offset this habitat loss. No active restoration of this species is proposed, and no post-implementation  
38 monitoring of affected occurrences and occurrences in reserve lands would be done. Because loss of  
39 modeled habitat for the species would be offset through restoration, the overall effect of Alternative  
40 1A on this species would not be adverse.

41 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven  
42 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
43 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
44 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill  
45 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak

1 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
2 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.  
3 Although no active restoration of this species is proposed, post-implementation monitoring of soft  
4 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that  
5 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft  
6 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and  
7 habitat modification is the primary factor responsible for the species' decline and limiting the  
8 species' distribution and abundance. Improving habitat functions for this species would provide a  
9 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.  
10 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft  
11 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.  
12 Therefore, it is likely that the overall effect of Alternative 1A on this species would not be adverse.

13 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be  
14 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
15 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
16 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological  
17 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle  
18 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
19 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In  
20 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective  
21 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences  
22 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or  
23 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement  
24 of habitat functions, and establishment of new occurrences would offset any potential loss of  
25 modeled habitat for Suisun Marsh thistle.

26 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential  
27 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun  
28 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives  
29 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by  
30 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered  
31 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable  
32 expectation that habitat restoration without active species-specific restoration activities would  
33 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-  
34 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to  
35 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative  
36 1A on Bolander's water hemlock could be adverse.

37 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants  
38 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative  
39 1A would result in no adverse effects on seven of eight special-status grassland plants in the study  
40 area. Alternative 1A would result in a reduction in the range and numbers of Bolander's water-  
41 hemlock, which would be an adverse effect. Adverse effects on Bolander's water-hemlock could be  
42 avoided or offset through implementation of Mitigation Measure BIO-170.

43 **CEQA Conclusion:** Because loss of occurrences and modeled habitat for covered tidal habitat plant  
44 species would be offset through habitat restoration, impacts on covered tidal wetland plants as a  
45 result of implementing Alternative 1A would not be significant. However, the loss of Bolander's

1 water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this  
2 species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would  
3 reduce this impact to a less-than-significant level.

4 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
5 **Special-Status Plant Species**

6 Please see Mitigation Measure BIO-170 under Impact BIO-170.

7 **Inland Dune Plants**

8 Five special-status plants occur in inland dune habitat in the study area. None of the species is  
9 covered under the BDCP, and no habitat models were prepared for inland dune habitat. Table 12-  
10 1A-67 summarizes the acreage of inland dune habitat in the study area and the number of  
11 occurrences of each special-status inland dune plant in the study area.

12 **Table 12-1A-67. Summary of Impacts on Inland Dune Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Inland Dunes	19	0	0	0	None
<b>Noncovered Species</b>					
Hoover's cryptantha	0	0	1	0	None
Antioch Dunes buckwheat	0	0	1	0	None
Mt. Diablo buckwheat	0	0	1	0	None
Contra Costa wallflower	0	0	3	0	None
Antioch Dunes evening-primrose	0	0	9	0	None

13

14 **Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants**

15 Alternative 1A, would have no adverse effects on inland dune plants (Table 12-1A-67). No  
16 construction activities or habitat restoration would take place where the species occur. No specific  
17 actions to benefit inland dune species are proposed.

18 **NEPA Effects:** Implementing the BDCP under Alternative 1A would not affect special-status inland  
19 dune plant species.

20 **CEQA Conclusion:** Because the BDCP would not affect inland dune habitat, implementation of  
21 Alternative 1A would have no impacts on inland dune species. No mitigation is required.

22 **Nontidal Wetland Plants**

23 No covered plant species occur in nontidal wetlands in the study area; however, six noncovered  
24 special-status plant species occur in nontidal wetlands in the study area. Table 12-1A-68  
25 summarizes the acreage of nontidal wetland habitat in the study area and the number of  
26 occurrences of each special-status nontidal wetland plant in the study area.

1 **Table 12-1A-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 1A**

	Acres in Study Area	Acres affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Nontidal perennial aquatic	5,567	290	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	128	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass Fisheries enhancements, and floodplain restoration
<b>Noncovered Species</b>					
Watershield	0	0	3	1	Loss of habitat from construction of water conveyance facilities
Bristly sedge	0	0	18	2	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow <sup>a</sup>	0	0	121	13	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Eel grass pondweed	0	0	1	0	None
Sanford's arrowhead	0	0	23	2	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Marsh skullcap <sup>a</sup>	0	0	5	0	None

<sup>a</sup> Also occurs in valley/foothill riparian habitat.

2

3 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

4 Under Alternative 1A, known occurrences watershield, bristly sedge, woolly rose-mallow, and  
 5 Sanford's arrowhead are within the proposed footprint for the water conveyance facilities or within  
 6 the hypothetical footprint for restoration activities and would be adversely affected. Alternative 1A  
 7 would have no adverse effects on eel-grass pondweed or marsh skullcap.

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

- 11 • *CM1 Water Facilities and Operations*: Construction of the Alternative 1A water conveyance  
 12 facilities would adversely affect four noncovered special-status plants occurring in nontidal  
 13 wetlands. One of three watershield occurrences in CZ 5 on Bouldin Island could be affected by

1 construction of the water conveyance facilities. This is a historical occurrence that has not been  
2 observed since 1893, and it may be extirpated (California Department of Fish and Wildlife  
3 2013). Two occurrences of bristly sedge in CZ 4 and CZ 5, including approximately 1.54 acres of  
4 occupied habitat, would be affected by construction of the water conveyance facilities. Twelve  
5 occurrences of woolly rose-mallow would be affected. Three occurrences in CZ 3 would be  
6 removed during construction of the intake facilities, and five occurrences in CZ 6 and one  
7 occurrence in CZ 8 would be affected by construction of other facilities. Construction of the  
8 water conveyance facilities would remove occupied habitat at one occurrence of Sanford's  
9 arrowhead in CZ 5.

- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal  
11 wetland plants are present in the hypothetical footprint for construction or operation of the  
12 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass  
13 fisheries enhancements would not affect special-status nontidal marsh plants.
- 14 • *CM3 Natural Communities Protection and Restoration*: No specific natural communities  
15 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of  
16 special-status nontidal plants are proposed for protection.
- 17 • *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead and  
18 one occurrence of woolly rose mallow in CZ 7 are present within areas that could be affected by  
19 tidal habitat restoration. Therefore, tidal habitat restoration could have an adverse effect on  
20 these two species. No other known occurrences of special-status nontidal wetland plants are  
21 present within areas proposed for tidal habitat restoration.
- 22 • *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status  
23 nontidal wetland plants are present within areas proposed for floodplain restoration. Therefore,  
24 floodplain restoration and construction of new floodplain levees would have no impacts on  
25 special-status nontidal wetland plants.
- 26 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland  
27 plants are present within areas proposed for channel margin habitat enhancement. Therefore,  
28 channel margin habitat enhancement would have no impacts on special-status nontidal wetland  
29 plants.
- 30 • *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal  
31 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,  
32 riparian habitat restoration would have no impacts on special-status nontidal wetland plants.
- 33 • *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal  
34 wetland plants are present within areas proposed for grassland communities restoration.  
35 Therefore, grassland communities restoration would have no impacts on special-status nontidal  
36 wetland plants.
- 37 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of  
38 special-status nontidal wetland plants are present within areas proposed for vernal pool and  
39 alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration would  
40 have no impacts on special-status nontidal wetland plants.
- 41 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
42 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing  
43 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.

1 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater  
2 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial  
3 emergent wetland communities, and by maintaining and enhancing the habitat functions of  
4 protected and created nontidal wetland habitats for covered and other native species. However,  
5 no specific actions to benefit noncovered species are proposed.

6 Under Alternative 1A, 1,500 acres of nontidal marsh would be restored (Objective  
7 NFEW/NPANC1.1, addressed under CM10). However, these wetlands would be restored primarily  
8 as habitat for giant garter snake. These habitat restoration activities would be unlikely to expand the  
9 amount of habitat available to watershield, bristly sedge, woolly rose-mallow, and Sanford's  
10 arrowhead, potential loss of habitat or occurrences resulting from covered activities would not be  
11 compensated for. Moreover, because special-status nontidal wetland plant species are not covered  
12 under the BDCP, the species protections afforded to covered species under CM22 do not apply to  
13 these species, and the effects of Alternative 1A on these species would be adverse.

14 **NEPA Effects:** Implementation of the BDCP under Alternative 1A could result in a reduction in the  
15 range and numbers of watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead,  
16 four noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on  
17 these species could be avoided or offset through implementation of Mitigation Measure BIO-170.

18 **CEQA Conclusion:** Under Alternative 1A, construction of the water conveyance facilities could result  
19 in a reduction in the range and numbers of watershield, bristly sedge, woolly rose-mallow, and  
20 Sanford's arrowhead. Tidal habitat restoration could result in a reduction in the range and numbers  
21 of Sanford's arrowhead. These impacts would be significant. Implementation of Mitigation Measure  
22 BIO-170 would reduce these impacts to a less-than-significant level.

23 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
24 **Special-Status Plant Species**

25 Please see Mitigation Measure BIO-170 under Impact BIO-170.

26 **General Terrestrial Biology Effects**

27 **Wetlands and Other Waters of the United States**

28 Alternative 1A actions would both permanently and temporarily remove or convert wetlands and  
29 open water that is potentially jurisdictional as regulated by USACE under Section 404 of the CWA.  
30 The following two impacts address the project-level effects of CM1 on these potential wetlands and  
31 waters, and the programmatic-level effects of other relevant conservation actions (CM2–CM10).  
32 CM11–CM22 would not directly result in loss or conversion of wetlands or other waters of the  
33 United States. The methods used to conduct these analyses are described in Section 12.3.2.4 of this  
34 chapter.

35 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**  
36 **Other Waters of the United States**

37 Construction of the Alternative 1A water conveyance facilities would both temporarily and  
38 permanently remove potential wetlands and other waters of the United States as regulated by  
39 Section 404 of the CWA (Table 12-1A-69). Based on the methodology used to conduct this analysis,  
40 the losses would occur at intake, tunnel, pipeline, canal, and RTM and borrow/spoil storage sites,

1 transmission corridors, and multiple temporary work areas associated with the construction  
 2 activity. The permanent open water and wetland losses (188 acres) would occur at various locations  
 3 along the pipeline/tunnel alignment, but the majority would occur due to construction of Alternative  
 4 1A's five intake structures along the eastern bank of the Sacramento River between Freeport and  
 5 Courtland in the north Delta (including associated spoil/borrow areas), construction of forebays in  
 6 both the north and south Delta areas, and the RTM storage sites associated with tunnel construction  
 7 at various locations, including on Andrus, Tyler, Venice and Bacon Islands. However, through  
 8 implementation of an environmental commitment to reuse RTM or dispose of it at appropriate  
 9 facilities, as described in Appendix 3B, *Environmental Commitments*, it is anticipated that the  
 10 material would be removed from these areas and applied, as appropriate, as bulking material for  
 11 levee maintenance or as fill material for habitat restoration projects, or would be put to other  
 12 beneficial means of reuse identified for the material. The temporary open water and wetland effects  
 13 (164 acres) would also occur mainly at the five intake construction sites along the eastern bank of  
 14 the Sacramento River, and at barge unloading facilities in the San Joaquin and Middle Rivers.

15 **Table 12-1A-69. Potential Wetlands and Other Waters of the United States Filled by Construction**  
 16 **of Alternative 1A Water Conveyance Facilities (acres)**

Wetland/Other Water Type <sup>a</sup>	Permanent <sup>b</sup>	Temporary	Total
<b>Open Water</b>			
Nontidal Flow	78	19	97
Muted Tidal Flow	<1	<1	<1
Tidal Flow	34	127	161
Pond or Lake (nontidal)	2	2	4
Clifton Court Forebay	1	0	1
<b>Wetland</b>			
Nontidal Wetland	67	9	76
Tidal Wetland	5	4	9
Seasonal Wetland	<1	3	4
<b>Total Impact Acres</b>	<b>188</b>	<b>164</b>	<b>352</b>

<sup>a</sup> Wetland types are described in the methods section of this chapter (Section 12.3.2.4).

<sup>b</sup> Effects include fill from construction of 10-foot high RTM storage sites.

Source: California Department of Water Resources 2013b

17

18 **NEPA Effects:** The permanent and temporary loss of these potential jurisdictional wetlands as a  
 19 result of constructing Alternative 1A water conveyance facilities would be a substantial effect if not  
 20 compensated by wetland protection and/or restoration. This loss would represent a removal of  
 21 federally protected wetlands as defined by Section 404 of the CWA. However, Alternative 1A  
 22 includes conservation measures (CM4 and CM10) that would restore and protect large acreages of  
 23 both tidal and nontidal wetlands and open water in the study area. Through the course of the BDCP  
 24 restoration program, this alternative would restore 65,000 acres of tidal and 1,200 acres of nontidal  
 25 wetland or open water. Impacts on wetlands from CM1 construction would occur in the first 10  
 26 years after BDCP approval. Approximately 19,550 acres of this wetland restoration would occur  
 27 during this time period, thereby offsetting the impacts of CM1 construction. These acreages greatly  
 28 exceed the no net loss (1:1 replacement ratio) requirement for Alternative 1A (352 acres).

1 Therefore, there would be an overall beneficial effect on potential jurisdictional wetlands and other  
2 waters of the United States from BDCP implementation.

3 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
4 of constructing Alternative 1A water conveyance facilities would be a substantial impact if not  
5 compensated for by wetland protection and/or restoration. This loss would represent either  
6 temporary or permanent removal of federally protected wetlands or other waters of the United  
7 States as defined by Section 404 of the CWA. However, Alternative 1A includes conservation  
8 measures (CM4 and CM10) that would restore and protect large acreages of both tidal and nontidal  
9 wetlands and open water. Through the course of the BDCP restoration program, this alternative  
10 would result in restoration of 65,000 acres of tidal and 1,200 acres of nontidal wetlands and open  
11 water. Impacts on wetlands from CM1 construction would occur in the first 10 years after BDCP  
12 approval. Approximately 19,550 acres of this wetland restoration would occur during this time  
13 period, thereby offsetting the impacts of CM1 construction. These acreages greatly exceed the no net  
14 loss (1:1 replacement ratio) requirement for Alternative 1A (352 acres). Therefore, there would be a  
15 beneficial impact on potential jurisdictional wetlands and other waters of the United States from  
16 BDCP implementation.

### 17 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on** 18 **Wetlands and Other Waters of the United States**

19 The habitat protection and restoration activities associated with Alternative 1A's other conservation  
20 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of  
21 the United States in the study area over the course of BDCP conservation action implementation.  
22 Because these conservation measures have not been defined to the level of site-specific footprints, it  
23 is not possible to delineate and quantify these effects in detail. Several of the conservation measures  
24 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects  
25 analysis contained in Chapter 5 of the BDCP. These theoretical footprints have been used to predict  
26 the acres of natural communities that would be affected through loss or conversion, which gives  
27 some indication of jurisdictional wetland effects. Any CM2–CM10 effects ascribed to tidal perennial  
28 aquatic, tidal brackish emergent, tidal freshwater emergent, other natural seasonal, nontidal  
29 freshwater perennial emergent, and nontidal perennial aquatic wetlands natural communities are  
30 likely to also be effects on wetlands and other waters of the United States. Effects ascribed to other  
31 natural communities and land cover types with small jurisdictional wetland components  
32 (valley/foothill riparian, alkali seasonal wetland complex, vernal pool complex, managed wetland,  
33 grassland and cultivated land) are not easily converted to effects on wetlands and other waters of  
34 the United States by the use of theoretical footprints. Because of this lack of detail, a programmatic  
35 assessment is provided for these other conservation measures.

36 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland  
37 natural communities through implementation of CM2–CM10 for Alternative 1A would be in the  
38 range of 5,500 to 6,000 acres, assuming that 100% of the predominantly wetland natural  
39 communities listed in Table 12-1A-69 and that 10% of all of the non-wetland natural communities  
40 listed in that table would qualify as wetlands or other waters of the United States under the CWA.  
41 Most of these wetlands would be converted to tidal and nontidal wetlands and open water through  
42 implementation of CM4, and CM10. The wetlands and open water created by these two restoration  
43 actions would be approximately 66,200 acres, far exceeding what is required under the no net loss  
44 policy used by the USACE in considering Section 404 permits, even if one were to assume that all  
45 conversions represented a functional wetland loss. Therefore, there would be a beneficial effect on



1 potential jurisdictional wetlands and other waters of the United States from implementing CM2–  
2 CM10.

3 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
4 of implementing the other conservation measures (CM2–CM10) of Alternative 1A would be a  
5 substantial effect if not compensated for by wetland protection and/or restoration. This loss would  
6 represent a removal of federally protected wetlands or other waters of the United States as defined  
7 by Section 404 of the CWA. However, Alternative 1A includes conservation measures (CM4 and  
8 CM10) that would restore large acreages of both tidal and nontidal wetlands and open water in the  
9 study area. Over the life of the BDCP restoration program, this alternative would result in  
10 restoration of 66,200 acres of tidal and nontidal wetlands and open water, of which 19,550 acres  
11 would be restored in the first 10 years. These acreages greatly exceed the no net loss (1:1  
12 replacement ratio) requirement for Alternative 1A (5,500–6,000 acres). Therefore, there would be a  
13 beneficial impact on potential jurisdictional wetlands and other waters of the United States from  
14 implementing CM2–CM10.

### 15 **Shorebirds and Waterfowl**

16 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,  
17 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for  
18 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for  
19 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to  
20 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to  
21 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether  
22 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture  
23 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts  
24 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat  
25 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of  
26 population abundance objectives and the use of species-habitat models to link population objectives  
27 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives  
28 into habitat objectives, while explicitly identifying the biological assumptions that underpin these  
29 models and the data used to populate them. As a result, the CVJV's biological planning provides a  
30 framework for evaluating the effects of the BDCP on waterfowl.

31 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all  
32 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,  
33 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The  
34 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn  
35 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food  
36 supplies for geese would still be well in excess of demand even with the loss of these agricultural  
37 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives  
38 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of  
39 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly  
40 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging  
41 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to  
42 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report  
43 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model  
44 used to quantify effects on food biomass and food quality.

1 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and  
2 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase  
3 and decrease in natural communities known to provide important foraging, roosting, and breeding  
4 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley  
5 Joint Venture Basins that overlap with the BDCP Plan Area: Yolo, Delta, and Suisun. Natural  
6 community losses and gains were then translated into species-specific outcomes, comparing the  
7 relative habitat value of each BDCP natural community for each Central Valley shorebird species  
8 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF  
9 International 2013) was modified from a table in Stralberg et. al (2010). The table was created using  
10 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and  
11 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

12 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**  
13 **Water Conveyance Facilities Construction**

14 Development of the water conveyance facilities (CM1) would result in the permanent removal of  
15 approximately 3 acres of managed wetland, 6 acres of tidal wetlands, 13 acres of nontidal wetlands,  
16 and 2,541 acres of suitable cultivated lands (including grain and hay crops, pasture, field crops, rice,  
17 and idle lands). In addition, 83 acres of managed wetland, 6 acres of tidal wetlands, 10 acres of  
18 nontidal wetlands, and 899 acres of cultivated lands would be temporarily impacted.

19 These losses of habitat would occur within the first 10 years of Alternative 1A implementation in the  
20 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice  
21 cultivated lands, 200 acres of rice, and 700 acres of rice or "rice equivalent" natural communities  
22 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would  
23 be created, protected, and enhanced, 8,850 acres of freshwater tidal wetlands would be restored,  
24 and 2,000 acres of tidal brackish emergent wetland would be restored (Table 3-4, Chapter 3).

25 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were  
26 present in or adjacent to work areas and could result in destruction of nests or disturbance of  
27 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
28 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on  
29 nesting birds.

30 **NEPA Effects:** Habitat loss from construction of the Alternative 1A water conveyance facilities would  
31 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural  
32 communities and cultivated lands that would be restored and protected in the near-term timeframe.  
33 If waterfowl were present in or adjacent to work areas, construction activities could result in  
34 destruction of nests or disturbance of nesting and foraging behaviors, which would be an adverse  
35 effect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*  
36 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
37 effects on nesting birds.

38 **CEQA Conclusion:** Habitat loss from construction of the Alternative 1A water conveyance facilities  
39 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of  
40 natural communities and cultivated lands that would be restored and protected in the near-term  
41 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could  
42 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a  
43 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*

1 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a  
2 less-than-significant level.

3 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
4 **Disturbance of Nesting Birds**

5 See Mitigation Measure BIO-75 under Impact BIO-75.

6 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**  
7 **Implementation of Conservation Components**

8 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated  
9 8,818 acres as a result of Alternative 1A implementation. This would represent a 25% decrease in  
10 managed seasonal wetlands compared with long-term conditions without Alternative 1A (Ducks  
11 Unlimited 2013, Table 5). There is considerable uncertainty about the biomass and nutritional  
12 quality of waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult  
13 to identify the amount of mitigation needed. To address this uncertainty, three levels of food  
14 biomass and three levels of nutritional quality were modeled for these existing habitats (Ducks  
15 Unlimited 2013, Table 7). Three mitigation scenarios based on these energetic assumptions of  
16 biomass and food quality were then run to determine a minimum acreage of managed seasonal  
17 wetlands to be protected and enhanced to compensate for the loss of productivity resulting from  
18 habitat conversion to tidal wetlands.

- 19 • Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low  
20 food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce  
21 50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds  
22 have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the  
23 assumption that managed seasonal wetlands in Suisun could be enhanced to provide high food  
24 biomass and high food quality (equal to wetlands in the Central Valley), 5,000 acres of managed  
25 wetlands protected and managed for high biomass and high food quality would mitigate the  
26 conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 27 • Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and  
28 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh  
29 produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and  
30 these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.  
31 Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to  
32 provide high food biomass and high food quality (equal to wetlands in the Central Valley),  
33 13,300 acres of managed wetlands protected and managed for high biomass and high food  
34 quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal  
35 marsh.
- 36 • Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low  
37 food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only  
38 be enhanced to provide medium food biomass and medium food quality (produce 75% of the  
39 seed biomass of seasonal wetlands elsewhere in the Central Valley, with these seeds having 80%  
40 of the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of  
41 managed wetlands protected and managed for medium biomass and medium food quality would  
42 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

1 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed  
2 seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat  
3 conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced  
4 productivity resulting from conversion of managed seasonal wetlands under the assumptions that  
5 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-  
6 quality food to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce  
7 high biomass and high food quality. However, the food biomass and productivity in Suisun Marsh  
8 would need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an  
9 adverse effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be  
10 needed. Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl*  
11 *in Suisun Marsh*, would be available to address this effect.

12 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000  
13 acres of palustrine tidal wetlands in the Delta watershed, and the replacement of 600 acres of  
14 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo watershed  
15 would not be expected to have an adverse effect on food productivity, under the assumption that  
16 these wetlands would provide adequate food sources. However, a monitoring component and a food  
17 study in these tidal habitats would be necessary in order to demonstrate that there would be a less  
18 than significant loss of food value in these habitats for wintering waterfowl. If it is determined from  
19 monitoring that there in fact would be a significant loss in food productivity resulting from habitat  
20 conversion to tidal wetlands, the protection and enhancement of managed wetlands in these  
21 watersheds would require mitigation for the change in food biomass and quality. Mitigation  
22 Measure *BIO-179b, Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine*  
23 *Tidal Wetlands in the Yolo and Delta Basins*, would be available to address this uncertainty.

24 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of  
25 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
26 the level of effect that Alternative 1A habitat loss or conversion would have. The BDCP has  
27 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in  
28 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal  
29 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.  
30 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
31 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing  
32 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food  
33 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high  
34 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would  
35 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 1A to avoid  
36 an adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a,  
37 *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to  
38 address this adverse effect.

39 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
40 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands  
41 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
42 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would  
43 provide adequate food sources is entirely dependent on assumptions about food production in  
44 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*  
45 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be  
46 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

1 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of  
2 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
3 the level of impact that Alternative 1A habitat loss or conversion would have. The BDCP has  
4 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in  
5 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal  
6 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.  
7 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
8 productivity resulting from conversion of managed seasonal wetlands under the assumptions that  
9 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-  
10 quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to  
11 produce high biomass and high-quality food. However, the food biomass and productivity in Suisun  
12 Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for  
13 Alternative 1A to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if  
14 additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct*  
15 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential  
16 significant impact.

17 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
18 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands  
19 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
20 food productivity. However, the conclusion that these tidal wetlands would provide adequate food  
21 sources for wintering waterfowl is entirely dependent on assumptions about food production in  
22 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are  
23 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and  
24 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*  
25 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address  
26 this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant  
27 level.

28 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering**  
29 **Waterfowl in Suisun Marsh**

30 Poorly managed wetlands (considered low biomass and food quality) will be identified and  
31 managed by BDCP proponents to improve food quality and biomass. Studies will be required to  
32 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic  
33 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to  
34 measure changes in the energetic productivity of these sites. Based on the food studies and  
35 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres  
36 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with  
37 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates  
38 that additional acreage is needed to meet this goal, additional acreage of protection or creation  
39 of managed wetlands and management will be required.

40 **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**  
41 **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

42 In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and  
43 Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and  
44 monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies

1 show that the assumption of no effect was inaccurate, and the food quality goal of 1:1  
2 compensation for wintering waterfowl food value is not met, additional acreage of protection or  
3 creation of managed wetland and management will be required.

4 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**  
5 **of Conservation Components**

6 Implementation of Alternative 1A would reduce managed wetlands in the Yolo and Delta basins by  
7 437 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands are  
8 managed as semi-permanent wetlands, Alternative 1A would reduce semipermanent wetlands in  
9 the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. While a reduction in  
10 these semipermanent habitats would represent a habitat loss for breeding waterfowl, with the  
11 restoration of 24,000 acres of palustrine tidal wetlands (Table 3-4, Chapter 3) in the Yolo and Delta  
12 basins there would be a less than adverse effect on breeding waterfowl. These palustrine habitats  
13 would presumably contain water during the breeding period (i.e., March through July), and would  
14 be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in the  
15 Yolo and Delta watersheds attributed to Alternative 1A.

16 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640  
17 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.  
18 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset  
19 the loss of breeding habitat, but this could further reduce food supplies available to wintering  
20 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
21 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

22 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded  
23 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000  
24 acres of semipermanent wetlands that would be protected and enhanced for wintering and  
25 migratory waterfowl (Table 3-4, Chapter 3; Objective MWNC1.1, BDCP Chapter 3, *Conservation*  
26 *Strategy*).

27 Food studies and monitoring would be necessary to determine how increases in tidal marsh and  
28 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be  
29 needed in order to quantify impacts on breeding waterfowl in Suisun Marsh and to determine not  
30 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for  
31 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*  
32 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the  
33 uncertainty of this effect.

34 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains  
35 several key upland areas that have significant nesting value. The largest block of upland habitat in  
36 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the  
37 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area  
38 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities  
39 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this  
40 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints  
41 were changed during the implementation process of BDCP to overlap with this area, the effects on  
42 breeding waterfowl would likely be greatly increased.

1 **NEPA Effects:** Alternative 1A would reduce managed wetlands in the Yolo and Delta basins by 437  
2 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are managed  
3 as semi-permanent wetlands, Alternative 1A would reduce semi-permanent wetlands in the Yolo  
4 and Delta drainage basins by 77 acres and 203 acres, respectively. The reduction in these semi-  
5 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the  
6 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1A  
7 would not have an adverse effect on breeding waterfowl. These palustrine habitats would  
8 presumably contain water during the breeding period (March through July), and would be expected  
9 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta  
10 watersheds attributed to Alternative 1A implementation. Total managed wetlands in Suisun Marsh  
11 would decline from 41,012 acres to 30,640 acres with the conversion of managed seasonal and  
12 semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands could be  
13 managed as semi-permanent wetlands to offset the loss of breeding habitat, but such management  
14 could further reduce food supplies available to wintering waterfowl under the assumption that  
15 semi-permanent wetlands provide few food resources compared with seasonally managed habitats.  
16 The protection and enhancement of 1,600 acres of permanently flooded managed wetlands would  
17 provide habitat for breeding waterfowl. However, food studies and monitoring would be necessary  
18 to determine how increases in tidal marsh and salinity levels would affect the overall reproductive  
19 capacity of the marsh. Therefore, the loss of breeding waterfowl habitat resulting from  
20 implementation of Alternative 1A could have an adverse effect. Mitigation Measure BIO-180,  
21 *Conduct Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to  
22 address the uncertainty of model assumptions and the potential adverse effect of habitat conversion  
23 on breeding waterfowl in Suisun Marsh.

24 **CEQA Conclusion:** Alternative 1A would reduce managed wetlands in the Yolo and Delta basins by  
25 437 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are  
26 managed as semi-permanent wetlands, Alternative 1A would reduce semi-permanent wetlands in  
27 the Yolo and Delta drainage basins by 77 acres and 203, acres respectively. The reduction in these  
28 semi-permanent habitats would represent a habitat loss for breeding waterfowl. However, with the  
29 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1A  
30 would have a less-than-significant impact on breeding waterfowl. These palustrine habitats would  
31 presumably contain water during the breeding period (March through July), and would be expected  
32 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta  
33 watersheds attributed to Alternative 1A.

34 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the  
35 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the  
36 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of  
37 breeding habitat, but this management could further reduce food supplies available to wintering  
38 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
39 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of  
40 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,  
41 food studies and monitoring would be necessary to determine how increases in tidal marsh and  
42 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or  
43 conversion of habitat from implementation of Alternative 1A could have a significant impact on  
44 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food  
45 and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of  
46 model assumptions and reduce the impact to a less-than-significant level.

1           **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding**  
2           **Waterfowl in Suisun Marsh**

3           To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on  
4           breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine  
5           how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of  
6           the marsh.

7           The required studies will examine how increases in tidal marsh and salinity levels will affect the  
8           overall reproductive capacity of the Marsh. Reproductive studies will address but will not be  
9           limited to the following questions:

- 10           • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus  
11           managed habitats and across salinity gradients?
- 12           • How does waterfowl nest success and nest density vary with respect to tidal versus  
13           managed habitats and across salinity gradients?
- 14           • What are the patterns of habitat selection and movements by waterfowl broods in relation  
15           to tidal vs. managed habitats, and are there impacts on duckling survival?
- 16           • What is the current relationship between waterfowl reproductive success and interactions  
17           with alternate prey and predators, and how is tidal restoration likely to alter these  
18           relationships?

19           **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from Implementation of**  
20           **Conservation Components**

21           Shorebird use of the study area varies by species and fluctuates both geographically and by habitat  
22           type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of  
23           wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,  
24           dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide  
25           important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford  
26           et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of  
27           International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and  
28           roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type  
29           almost exclusively. Water depth in all of these habitat types is an important habitat variable as the  
30           majority of shorebird species require water depths of approximately 10–20 cm for foraging (Isola et  
31           al. 2000, Hickey et al. 2003).

32           ***Managed Wetlands***

33           **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo  
34           Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of  
35           which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by  
36           construction-related activities associated with tidal restoration (CM4) and Fisheries Enhancement  
37           activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and  
38           duration associated with the ongoing operation of a modified Fremont Weir (CM2) could  
39           periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of  
40           1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs (Table 5.4-2, in BDCP Chapter  
41           5, *Effects Analysis*) in the Yolo Basin.



1 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently  
2 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF  
3 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

4 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be  
5 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table  
6 4). Periodic flooding would not affect this natural community type in Suisun Basin.

7 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
8 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt  
9 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher  
10 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),  
11 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a rank  
12 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and whimbrel  
13 (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

14 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most  
15 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of  
16 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200  
17 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres  
18 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging  
19 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the  
20 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500  
21 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some  
22 benefit to wintering and breeding shorebirds.

### 23 **Cultivated Lands**

24 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities  
25 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272  
26 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and  
27 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an  
28 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512  
29 acres during a notch flow of 6,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*).

30 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration  
31 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an  
32 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted  
33 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the  
34 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

35 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
36 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*  
37 *vociferous*), long-billed curlew, and whimbrel within pasture habitat and sandhill crane was ranked  
38 1 for grain and hay crops. Long-billed dowitcher and killdeer both had a rank 2 for idle crop habitat  
39 suitability and black-bellied plover was ranked 2 for pasture habitat. Red-necked phalarope  
40 (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus tricolor*) were both ranked 2 for grain and  
41 hay crops. Long-billed dowitcher, dunlin, least sandpiper, and long-billed curlew were all ranked 3  
42 for rice habitat suitability and killdeer was ranked 3 for field crop habitat suitability.

1 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in  
2 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,  
3 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated  
4 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production  
5 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not  
6 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and  
7 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-  
8 tailed kite, and greater sandhill crane.

9 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while  
10 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF  
11 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's  
12 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

13 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total  
14 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant  
15 garter snake.

#### 16 **Tidal Wetlands**

17 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
18 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres  
19 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by  
20 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF  
21 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in  
22 Yolo Basin.

23 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as  
24 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently  
25 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of  
26 tidal wetlands in Delta Basin.

27 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently  
28 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF  
29 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

30 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
31 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least  
32 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher  
33 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew  
34 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.  
35 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For  
36 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-  
37 billed curlew and whimbrel were both ranked 3 for habitat suitability.

38 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large  
39 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of  
40 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal  
41 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,  
42 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats  
43 would be expected to require management, however, sediment augmentation has been discussed as

1 an experimental method that could be employed in places like Suisun to combat the loss of intertidal  
2 marshes in the face of sea level rise and reduced sediment supplies.

3 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).  
4 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and  
5 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on  
6 these lands would be likely to be focused on nonnative, invasive species management. Any  
7 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California  
8 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and  
9 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant  
10 garter snake.

### 11 ***Nontidal Wetlands***

12 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
13 within the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119  
14 acres of which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily  
15 lost by construction-related activities associated with Fisheries Enhancement activities (CM2)  
16 (Table 2, ICF International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont  
17 Weir operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically  
18 nontidal perennial aquatic habitat.

19 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted  
20 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International  
21 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5  
22 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from  
23 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

24 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool  
25 complex, would be permanently converted as a result of tidal restoration (CM4); and is not  
26 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural  
27 community type in Suisun Basin.

28 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
29 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and  
30 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for  
31 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat  
32 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal  
33 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial  
34 emergent wetland habitat suitability.

35 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP  
36 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant  
37 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo  
38 Basin (in the Cache Slough area).

39 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be  
40 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss  
41 could be permitted under the Plan. Protection of vernal pool complex natural community would  
42 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).

1 Protection of these two community types would enhance and manage habitat for vernal pool  
2 crustaceans and alkali-related plant species.

3 The protection and restoration of natural communities under the BDCP would also include  
4 management and enhancement actions under *CM11 Natural Communities Enhancement and*  
5 *Management*. The following management activities to benefit shorebirds would be considered for  
6 implementation under CM11, in areas where they would not conflict with covered species  
7 management.

8 ● Managed Wetlands

- 9 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for  
10 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 11 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize  
12 the extent of shallow-water habitat; varying depths within the wetland unit helps to create  
13 temporal variation in foraging opportunities. During warm, dry springs when wetland units  
14 dry quickly, wetland units can be re-supplied with water to extend habitat availability for  
15 shorebirds.
- 16 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped  
17 edges for nesting shorebirds between April and July.
- 18 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting  
19 and nesting.
- 20 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep  
21 angles.
- 22 ○ Limit levee maintenance during the nesting season (April through July). However, mowing  
23 the center of levees is fine.
- 24 ○ Potentially add material to levees or to islands to encourage nesting for some species.

25 ● Cultivated Lands

- 26 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote  
27 a diverse community of waterbirds, including shorebirds, during fall migration and winter  
28 (Shuford et al. 2013).
- 29 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a  
30 combination of flooding practices that include one-time water application and maintenance  
31 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 32 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July–September)  
33 can provide substantial benefits to shorebirds at a time of very limited shallow-water  
34 habitat on the landscape (Shuford et al. 2013).
- 35 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to  
36 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because  
37 this practice may not be as effective on soils that drain quickly.
- 38 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to  
39 increase the potential shorebird habitat on intentionally flooded or unflooded fields that  
40 may passively gather rain water (Iglecia et al. 2012).

- 1           ○ Shallowly flood available agricultural fields during July, August, and September to provide  
2           early fall migration habitat for shorebirds. Fields should be free of vegetation prior to  
3           flooding, have minimal micro-topography (e.g. no large clods), and should remain flooded  
4           for up to three week periods (after three weeks, vegetation encroachment reduces habitat  
5           value for shorebirds; ICF International 2013).
- 6           ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or  
7           drive on levees during the nesting season (April- July, Iglecia et al. 2012).
- 8           ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of  
9           wider levees (Iglecia et al. 2012).
- 10          ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to  
11          provide nesting habitat for American avocets (Iglecia et al. 2012).
- 12          ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be  
13          more appealing for nesting shorebirds (Iglecia et al. 2012).
- 14          ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
- 15          ○ Islands should be disked along with the rest of the field after harvest to help inhibit  
16          vegetation growth (Iglecia et al. 2012).

17           **NEPA Effects:** Alternative 1A implementation would result in the conversion of managed wetland  
18           and cultivated lands to tidal natural communities, including tidal mudflat. The result would be  
19           substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,  
20           and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
21           sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
22           willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and  
23           management of the remaining acres would likely have substantial benefits for select species of  
24           wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
25           across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
26           and rice types. While the protection, enhancement, and management of these crop types are being  
27           driven by covered species, these management actions would also benefit shorebirds. The protection,  
28           enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
29           for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would  
30           be unlikely to compensate for the overall loss. However, with the protection and restoration of acres  
31           in the Delta and Yolo watersheds, in addition to the implementation of the management actions  
32           outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not  
33           be expected to result in an adverse effect on shorebird populations in the study area.

34           **CEQA Conclusion:** Alternative 1A implementation would result in the conversion of managed  
35           wetland and cultivated lands to tidal natural communities, including tidal mudflat. The result would  
36           be significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,  
37           and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
38           sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
39           willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and  
40           management of the remaining acres would likely have substantial benefits for select species of  
41           wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
42           across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
43           and rice types. While the protection, enhancement, and management of these types are being driven  
44           by covered species, these management actions would also benefit shorebirds. The protection,

1 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
2 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be  
3 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in  
4 the Delta and Yolo watersheds, in addition to the implementation of the management actions  
5 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be  
6 expected to have a less-than-significant impact on shorebird populations in the study area.

### 7 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical** 8 **Transmission Facilities**

9 New transmission lines installed in the study area would increase the risk for bird-power line  
10 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network  
11 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New  
12 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl  
13 species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill*  
14 *Crane* would reduce potential effects through the installation of flight-diverters on new transmission  
15 lines, and selected existing transmission lines in the study area.

16 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power  
17 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the  
18 construction of new transmission lines on shorebird and waterfowl would not be adverse.

19 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl  
20 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential  
21 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-  
22 significant level.

### 23 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

24 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
25 with construction-related activities could result in temporary disturbances that affect shorebird and  
26 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,  
27 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
28 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging  
29 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on  
30 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
31 *Disturbance of Nesting Birds*, would be available to minimize effects on active nests. The use of  
32 mechanical equipment during water conveyance construction could cause the accidental release of  
33 petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the  
34 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*  
35 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge  
36 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have  
37 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to  
38 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to  
39 work areas.

40 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
41 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and  
42 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
43 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas

1 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
2 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
3 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
4 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
5 specific effects. Increased methylmercury associated with natural community and floodplain  
6 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as  
7 described in BDCP Appendix 5.D, *Contaminants*).

8 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
9 with site-specific conditions and would need to be assessed at the project level. Measures described  
10 in BDCP Chapter 3, Section 3.4.13, *Conservation Measure 12 Methylmercury Management*, include  
11 provisions for project-specific Mercury Management Plans. Site-specific restoration plans that  
12 address the creation and mobilization of mercury, as well as monitoring and adaptive management  
13 as described in CM12 would be available to address the uncertainty of methylmercury levels in  
14 restored tidal marsh and potential impacts on shorebirds and waterfowl.

15 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
16 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
17 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
18 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
19 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
20 classes within a species. In addition, the effect of selenium on a species can be confounded by  
21 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
22 2009).

23 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
24 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
25 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
26 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
27 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
28 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
29 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
30 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
31 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
32 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
33 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
34 levels of selenium have a higher risk of selenium toxicity.

35 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
36 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
37 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl  
38 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
39 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
40 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
41 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
42 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
43 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
44 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
45 alternative. However, it is difficult to determine whether the effects of potential increases in

1 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)  
2 would lead to adverse effects on shorebirds and waterfowl species.

3 Because of the uncertainty that exists at this programmatic level of review, there could be a  
4 substantial effect on shorebirds and waterfowl from increases in selenium associated with  
5 restoration activities. This effect would be addressed through the implementation of *AMM27*  
6 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
7 provide specific tidal habitat restoration design elements to reduce the potential for  
8 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
9 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
10 evaluated separately for each restoration effort as part of design and implementation. This  
11 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
12 design schedule.

13 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 1A water  
14 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work  
15 areas. Moreover, operation and maintenance of the water conveyance facilities, including the  
16 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
17 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these  
18 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
19 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.  
20 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to  
21 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
22 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
23 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the  
24 indirect effects associated with noise and visual disturbances, and increased exposure to selenium  
25 from Alternative 1A implementation would not have an adverse effect on shorebirds and waterfowl.  
26 Tidal habitat restoration is unlikely to have an adverse effect on shorebirds and waterfowl through  
27 increased exposure to methylmercury, as these species currently nest and forage in tidal marshes  
28 with elevated methylmercury levels. However, it is unknown what concentrations of methylmercury  
29 are harmful to species of waterfowl and shorebirds, and the potential for increased exposure would  
30 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and  
31 adaptive management, described in *CM12 Methylmercury Management*, would address the  
32 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other  
33 information is developed, the site-specific planning phase of marsh restoration would be the  
34 appropriate place to assess the potential risk of shorebird and waterfowl exposure to  
35 methylmercury.

36 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a  
37 result of Alternative 1A water conveyance facilities construction and operation and maintenance  
38 would have a significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these  
39 impacts, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
40 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant  
41 level. Tidal habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl  
42 species through increased exposure to methylmercury, as these species currently nest and forage in  
43 tidal marshes with elevated methylmercury levels. However, it is unknown what concentrations of  
44 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans  
45 that address the creation and mobilization of mercury, as well as the monitoring and adaptive  
46 management described in *CM12*, would be the appropriate place to assess the potential risk of



1 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration  
2 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be  
3 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
4 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
5 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1A  
6 implementation would have a less-than-significant impact on shorebirds and waterfowl.

7 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
8 **Disturbance of Nesting Birds**

9 See Mitigation Measure BIO-75 under Impact BIO-75.

10 **Common Wildlife and Plants**

11 Common wildlife and plants are widespread, often abundant, species that are not covered under  
12 laws or regulations that address conservation or protection of individual species. Examples of  
13 common wildlife and plants occurring in the study area are provided within the discussion for each  
14 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts  
15 on common wildlife and plants would occur through the same mechanisms discussed for natural  
16 communities and special-status wildlife and plants for each alternative.

17 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

18 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are  
19 discussed in in the analysis of Alternative 1A effects on natural communities (Impacts BIO-1 through  
20 BIO-31). In general, effects on habitat of common wildlife and plants would not be adverse. Through  
21 the course of implementing the Plan over a 50-year time period, several natural communities and  
22 land cover types would be reduced in size, primarily from restoration of other natural communities.  
23 Grassland, managed wetland and cultivated lands would be reduced in acreage, so the common  
24 species that occupy these habitats would be affected. However, the losses in acreage and value of  
25 these habitats would be offset by protection, restoration, enhancement and management actions  
26 contained in the BDCP, including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal*  
27 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel*  
28 *Margin Enhancement*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
29 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10*  
30 *Nontidal Marsh Restoration*, and *CM11 Natural Communities Enhancement and Management*. In  
31 addition, the AMMs contained in Appendix 3.C of the BDCP would be in place to reduce or eliminate  
32 the potential to adversely affect both special-status and common wildlife and plants.

33 Direct effects on common wildlife and plants from constructing water conveyance facilities and  
34 implementing BDCP conservation measures would include construction or inundation-related  
35 disturbances that result in injury or mortality of wildlife or plants and the immediate displacement  
36 of wildlife. Indirect effects include project-related disturbances to nearby wildlife and plants during  
37 construction (e.g., disruption of breeding and foraging behaviors from noise and human activity,  
38 habitat degradation from fugitive dust and runoff) and effects occurring later in time (e.g., collisions  
39 of birds with transmission lines, habitat fragmentation, vegetation management). Indirect effects  
40 could result both from construction and from operations and maintenance (e.g., ground  
41 disturbances could result in the spread and establishment of invasive plants).

1 **NEPA Effects:** The direct and indirect effects of constructing water conveyance facilities and  
2 restoring tidal and other habitats associated with Alternative 1A would not be adverse to common  
3 wildlife and plants because conservation measures and AMMs also expand and protect natural  
4 communities, avoid or minimize effects on special-status species, prevent the introduction and  
5 spread of invasive species, and enhance natural communities. These actions would result in avoiding  
6 and minimizing effects on common wildlife and plants as well.

7 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat  
8 restoration activities would have impacts on common wildlife and plants in the study area through  
9 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not  
10 be substantial, because habitat restoration would increase the amount and extent of habitat  
11 available for use by most common wildlife and plant species. Conservation measures to avoid or  
12 minimize effects on special-status species, to prevent the introduction and spread of invasive  
13 species, and to enhance natural communities also would result in avoiding and minimizing effects on  
14 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any  
15 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would  
16 be less than significant. No mitigation would be required.

#### 17 **Wildlife Corridors**

18 Essential Connectivity Areas (ECAs) are lands likely to be important to wildlife movement between  
19 large, mostly natural areas at the state wide level. The ECAs form a functional network of wildlands  
20 that are considered important to the continued support of California's diverse natural communities.  
21 Four general areas were identified within the study area that contain ECAs (Figure 12-2). The BDCP  
22 also identified important landscape linkages in the Plan Area to guide reserve design, which can also  
23 be seen on Figure 12-2.

#### 24 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

25 Alternative 1A water conveyance facilities would cross two of the ECAs identified during the  
26 analysis, the Stone Lake-Yolo Bypass ECA and the Mandeville Island-Staten Island ECA. The  
27 conveyance facilities would also cross one landscape linkage identified in the BDCP, the *Middle River*  
28 linkage (#6 in Figure 12-2). Though the conveyance facilities shown on Figure 12-2 overlap with the  
29 line representing the Sacramento River linkage (#9 in Figure 12-2) this line generally represents the  
30 course of the Sacramento River and is intended to address the needs of aquatic species and will thus  
31 not be addressed in this chapter.

32 The construction of Intakes 1,2, 3, and 4, associated borrow and RTM areas, and forebay just east  
33 and south of Clarksburg, would be constructed within the Stone Lake-Yolo Bypass ECA. These  
34 activities would result in the permanent loss of narrow strips of riparian vegetation along the  
35 Sacramento River and the permanent and temporary loss of cultivated lands. Alternative 1A would  
36 not substantially increase impediments to the movement of any wildlife that could move from Stone  
37 Lakes to Yolo Bypass because the Sacramento River and Sacramento River Deep Water Ship Channel  
38 already create a barrier to dispersal for nonavian species. However, the conversion of riparian and  
39 cultivated lands and the presence of the intakes and forebay would create a substantial barrier to  
40 the north-south movement of nonavian terrestrial species in the area between the Sacramento River  
41 and the Southern Pacific Dredger Cut west of Stone Lakes, as well as the east-west movement  
42 between Stone Lakes and the east bank of the Sacramento River. No records of wildlife species were  
43 identified within these construction footprints, though there are several records for Swainson's  
44 hawk in the vicinity. Though there would be losses in Swainson's hawk foraging habitat and

1 potential nesting habitat in these areas, these losses would not substantially impede the movements  
2 of Swainson's hawks in the area. The loss in habitat is addressed in the Swainson's hawk effects  
3 analysis.

4 The addition of new permanent transmission lines within the Stone Lake-Yolo Bypass ECA could  
5 adversely affect birds during periods of low visibility. Sandhill cranes that are known to roost at  
6 Stone Lakes could particularly be adversely affected by the addition of the north-south running  
7 transmission line to the west of Stone Lakes (see impact discussions for greater and lesser sandhill  
8 cranes). No records of wildlife species were identified within these construction footprints, though  
9 there are several records for Swainson's hawk in the vicinity. Though there would be losses in  
10 Swainson's hawk foraging habitat and potential nesting habitat in these areas, these losses would not  
11 substantially impede the movements of Swainson's hawks in the area. The loss in habitat is  
12 addressed in the Swainson's hawk effects analysis.

13 The Alternative 1A transmission line would also pass through the Mandeville Island-Statens Island  
14 ECA, which also has several known roost locations for greater sandhill crane. As discussed above,  
15 the transmission lines could adversely affect the movement of cranes and other bird species during  
16 periods of low visibility. The conveyance alignment at this location would be within the pipeline and  
17 thus not create a barrier to wildlife movement.

18 Alternative 1A temporary transmission lines would cross the *Middle River* linkage on Woodward  
19 Island. This linkage was established to guide riparian restoration along the Middle River to  
20 improve riparian connectivity for the benefit of riparian brush rabbit, riparian woodrat, least Bell's  
21 vireo, yellow-breasted chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite. Because  
22 this transmission line is temporary it would only temporarily conflict with the future planning for  
23 and the current movement of the avian species that use riparian corridors.

24 Alternative 1A conveyance facilities would create a local barrier to wildlife movement in the area  
25 between Hood and Clarksburg along the east side of the Sacramento River. The temporary and  
26 permanent transmission lines would create additional barriers to movement for avian species  
27 during periods of low visibility. However, overall the Alternative 1A alignment would not create  
28 substantial barriers to movement between ECAs because the majority of the alignment consists of a  
29 tunnel that would be beneath riparian corridors, which are the most likely dispersal routes for  
30 terrestrial animals in the majority of the study area, and because the large surface impacts (the  
31 intakes and forebay) are in areas that already have barriers to movement for nonavian terrestrial  
32 species (Sacramento River and Sacramento River Deep Water Ship Channel; and the Clifton Court  
33 Forebay and associated canals).

34 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*  
35 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*  
36 *Restoration*). These activities would generally improve the movement of wildlife within and outside  
37 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and  
38 management of these areas (CM11) would improve and maintain wildlife corridors within the study  
39 area.

40 **NEPA Effects:** Alternative 1A conveyance facilities would create local barriers to dispersal but  
41 overall the restoration activities would improve opportunities for wildlife dispersal within the study  
42 area and between areas outside of the study area and therefore overall Alternative 1A would not  
43 adversely affect wildlife corridors.

1 **CEQA Conclusion:** Alternative 1A conveyance facilities would create some localized disruption in  
2 wildlife movement and the permanent and temporary transmission lines would create additional  
3 barriers to movement for avian species during periods of low visibility. However, overall the  
4 Alternative 1A alignment would not create substantial barriers to movement between ECAs because  
5 the majority of the alignment consists of a tunnel that would be beneath riparian corridors, which  
6 are the most likely dispersal routes for terrestrial animals in the majority of the study area, and  
7 because the large surface impacts (the intakes and the forebay) are in areas that already have  
8 barriers to movement for nonavian terrestrial species (Sacramento River and Sacramento River  
9 Deep Water Ship Channel).

10 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*  
11 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*  
12 *Restoration*). These activities would generally improve the movement of wildlife within and outside  
13 of the Plan Area. In addition, the preservation of restored lands (CM3) and the enhancement and  
14 management of these areas (CM11) would improve and maintain wildlife corridors within the Plan  
15 Area.

16 Alternative 1A conveyance facilities would create local barriers to dispersal and create barriers to  
17 safe movement of avian species during periods of low visibility but overall the restoration activities  
18 would improve opportunities for wildlife dispersal within the study area and between areas outside  
19 of the study area and therefore overall Alternative 1A would result in less-than-significant impacts  
20 on wildlife corridors.

## 21 **Invasive Plant Species**

22 The invasive plant species that primarily affect natural communities in the study area, which include  
23 water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed in  
24 Section 12.1.4. Invasive species compete with native species for resources and can alter natural  
25 communities by influencing fire regimes, hydrology (e.g., sedimentation and erosion), light  
26 availability, nutrient cycling, and soil chemistry but also have the potential to harm human health  
27 and the economy by adversely affecting natural ecosystems, water delivery, flood protection  
28 systems, recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The  
29 construction and restoration activities covered under the BDCP could result in the introduction or  
30 spread of invasive plant species by creating temporary ground disturbance that provides  
31 opportunities for colonization by invasive plants in the study area.

32 The primary mechanisms for the introduction of invasive plants as the result of implementation of  
33 Alternative 1A are listed below.

- 34 ● Grading, excavation, grubbing, and placement of fill material.
- 35 ● Breaching, modification, or removal of existing levees and construction of new levees.
- 36 ● Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,  
37 electric transmission and gas lines, irrigation infrastructure).
- 38 ● Maintenance of infrastructure.
- 39 ● Removal of existing vegetation and planting or seeding of vegetation.
- 40 ● Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 41 ● Dredging waterways.

1 Clearing operations and the movement of vehicles, equipment, and construction materials in the  
2 study area would facilitate the introduction and spread of invasive plants by bringing in or moving  
3 seeds and other propagules. These effects would result from activities listed here.

- 4 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork  
5 operations are complete.
- 6 • Importing, distributing, storing, or disposing of fill, borrow, spoil, or dredge material.
- 7 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of  
8 construction staff.
- 9 • Transport of construction materials and equipment within the study area and to/from the study  
10 area.

11 Table 12-1A-70 lists the acreages of temporary disturbance in each natural community in the study  
12 area that would result from implementation of Alternative 1A.

13 **Table 12-1A-70. Summary of Temporary Disturbance in Natural Communities under Alternative 1A**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	149
Tidal brackish emergent wetland	--
Tidal freshwater emergent wetland	7
Valley/foothill riparian	151
Nontidal perennial aquatic	37
Nontidal freshwater perennial emergent wetland	2
Alkali seasonal wetland complex	--
Vernal pool complex	--
Managed wetland	127
Other natural seasonal wetland	--
Grassland	535
Inland dune scrub	--
Cultivated lands	3,748
<b>Total</b>	<b>4,756</b>

14  
15 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**  
16 **and Spread of Invasive Plant Species**

17 Under Alternative 1A, the BDCP would have adverse effects on natural communities resulting from  
18 the introduction and spread of invasive plant species through implementation of CM1–CM10 and  
19 CM22 (AMM6). No adverse effects are expected as a result of implementation of CM11–CM21.

- 20 • *CM1 Water Facilities and Operations*: Construction of the Alternative 1A water conveyance  
21 facilities would result in the temporary disturbance of 2,713 acres that would provide  
22 opportunities for colonization by invasive plant species.
- 23 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
24 enhancements would result in the temporary disturbance of 758 acres that would provide  
25 opportunities for colonization by invasive plant species. Vegetation maintenance activities for

1 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;  
2 however, the clearing of linear areas to facilitate water flow may also result in increased  
3 opportunities for invasion. Sediment removal, transportation, and application as a source  
4 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance  
5 activities could also result in the spread of invasive species if the sediment contains viable  
6 invasive plant propagules.

- 7 ● *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural  
8 communities located in the 11 conservation zones would result in the temporary disturbance of  
9 restoration areas that would provide opportunities for colonization by invasive plant species.
- 10 ● *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of  
11 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish  
12 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would  
13 provide opportunities for colonization by invasive plant species. These adverse effects would be  
14 reduced by designing restoration projects to minimize the establishment of nonnative  
15 submerged aquatic vegetation. Early restoration projects would be monitored to assess the  
16 response of nonnative species to restoration designs and local environmental conditions. If  
17 indicated by monitoring results, the BDCP Implementation Office would implement invasive  
18 plant control measures in restored natural communities to help ensure the establishment of  
19 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively  
20 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural  
21 communities restoration sites.
- 22 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
23 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and  
24 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for  
25 colonization by invasive plant species.
- 26 ● *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were  
27 not estimated because specific locations for this activity and their areal extent have not been  
28 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut  
29 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and  
30 salmonid migration channels in the interior Delta) would result in the temporary disturbance of  
31 channel areas that would provide opportunities for colonization by invasive plant species.
- 32 ● *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat  
33 would result in the temporary disturbance of riparian areas that would provide opportunities  
34 for colonization by invasive plant species.
- 35 ● *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZs 1, 8  
36 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land  
37 that would provide opportunities for colonization by invasive plant species.
- 38 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: The restoration of vernal pool  
39 and alkali seasonal wetland complexes in CZs 1, 8, or 11 would result in the temporary  
40 disturbance of grassland areas that would provide opportunities for colonization by invasive  
41 plant species.
- 42 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through  
43 conversion of cultivated lands in CZs 2 and 4, would result in the temporary disturbance of  
44 fallow agricultural areas that would provide opportunities for colonization by invasive plant

1 species. These adverse effects would be reduced by monitoring the development of marsh  
2 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the  
3 establishment of native marsh vegetation or if restoration success could be improved with  
4 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation  
5 control measures and supplemental plantings would be implemented.

- 6 • *CM22 Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
7 *Material, and Dredged Material* would have adverse effects if spoils, RTM, dredged material, or  
8 chipped vegetative materials containing viable invasive plant propagules are used as topsoil in  
9 uninfested areas.

10 The adverse effects that would result from the introduction and spread of invasive plants through  
11 colonization of temporarily disturbed areas would be minimized by implementation of CM11, *AMM4*  
12 *Erosion and Sediment Control Plan*, *AMM10 Restoration of Temporarily Affected Natural Communities*,  
13 and *AMM11 Covered Plant Species*.

14 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by  
15 implementing invasive plant control within the BDCP reserve system to decrease competition with  
16 native species, thereby improving conditions for covered species, ecosystem function, and native  
17 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy  
18 to control or the most ecologically damaging nonnative plants for which effective suppression  
19 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,  
20 perennial pepperweed, barbrgrass, and rabbitsfoot grass would be controlled and tidal mudflats  
21 would be maintained. In riparian areas, invasive plant control would focus on reducing or  
22 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In  
23 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the  
24 cover of invasive plant species.

25 Implementation of AMM4, AMM10, and AMM11 would also reduce the adverse effects that could  
26 result from construction activities. The AMMs provide methods to minimize ground disturbance,  
27 guidance for developing restoration and monitoring plans for temporary construction effects, and  
28 measures to minimize the introduction and spread of invasive plants. AMM4 would include the  
29 preparation and implementation of an erosion and sediment control plan that would control erosion  
30 and sedimentation and restore soils and vegetation in affected areas. The restoration and  
31 monitoring plans for implementation of AMM10 would include methods for stockpiling, storing, and  
32 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive  
33 management strategies, reporting requirements, and success criteria. AMM10 would also involve  
34 planting native species appropriate for the natural community being restored, except at some  
35 borrow sites in cultivated lands that would be restored as grasslands.

36 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed  
37 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas  
38 to be cleared do contain invasive plants, then chipped vegetation material from those areas would  
39 not be used for erosion control but would be disposed to minimize the spread of invasive plant  
40 propagules (e.g., burning, composting). During construction of the water conveyance facilities and  
41 construction activities associated with the other CMs, construction vehicles and construction  
42 machinery would be cleaned prior to entering construction sites that are in or adjacent natural  
43 communities other than cultivated lands and prior to entering any BDCP restoration sites or  
44 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads  
45 through areas with infestations of invasive plant species would be cleaned before travelling to other

1 parts of the study area. Cleaning stations would be established at the perimeter of BDCP covered  
2 activities along construction routes as well as at the entrance to reserve system lands. Biological  
3 monitoring would include locating and mapping locations of invasive plant species within the  
4 construction areas during the construction phase and the restoration phase. Infestations of invasive  
5 plant species would be targeted for control or eradication as part of the restoration and revegetation  
6 of temporarily disturbed construction areas.

7 **NEPA Effects:** The implementation of AMM4, AMM10, AMM11, and CM11 would reduce the  
8 potential for the introduction and spread of invasive plants and avoid or minimize the potential  
9 effects on natural communities and special-status species; therefore, these effects would not be  
10 adverse.

11 **CEQA Conclusion:** Under Alternative 1A, impacts on natural communities from the introduction or  
12 spread of invasive plants as a result of implementing BDCP CM1-CM11 and AMM4, AMM10 and  
13 AMM11 would not result in the long-term degradation of a sensitive natural community due to  
14 substantial alteration of site conditions and would, therefore, be considered less than significant. No  
15 mitigation would be required.

## 16 **Compatibility with Plans and Policies**

### 17 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 18 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 19 **Addressing Terrestrial Biological Resources in the Study Area**

20 Constructing the water conveyance facilities (CM1) and implementing CM2–CM22 for Alternative 1A  
21 have the potential for being incompatible with plans and policies related to managing and protecting  
22 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and  
23 executive orders that are relevant to actions in the study area provide guidance for terrestrial  
24 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan  
25 and policy compatibility evaluates whether Alternative 1A would be compatible or incompatible  
26 with such enactments, rather than whether impacts would be adverse or not adverse, or significant  
27 or less than significant. If the incompatibility relates to an applicable plan, policy, or executive order  
28 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be  
29 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such  
30 physical effects of Alternative 1A on terrestrial biological resources are addressed under the impacts  
31 on natural communities and species. The following is a summary of compatibility evaluations  
32 related to terrestrial biological resources for laws, plans, policies, and executive orders relevant to  
33 the BDCP.

#### 34 **Federal and State Legislation**

- 35 • The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,  
36 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain  
37 legal guidance that either directly or indirectly promotes or stipulates the protection and  
38 conservation of terrestrial biological resources in the process of undertaking activities that  
39 involve federal decisionmaking. The biological goals and objectives contained in the BDCP that  
40 provide the major guidance for implementing the various conservation elements of Alternative  
41 1A are all designed to promote the long-term viability of the natural communities, special-status  
42 species, and common species that inhabit the Plan Area. While some of the conservation  
43 measures of the alternative involve permanent and temporary loss of natural communities and



1 associated habitats during facilities construction and expansion of certain natural communities,  
2 the long-term guidance in the Plan would provide for the long-term viability and expansion of  
3 the habitats and special-status species populations in the Plan Area. Alternative 1A conservation  
4 actions would be compatible with the policies and directives for terrestrial biological resources  
5 contained in these federal laws.

- 6 • *The California Endangered Species Act, California Native Plant Protection Act, Porter-Cologne*  
7 *Water Quality Control Act, and Natural Communities Conservation Planning Act* are state laws  
8 that have relevance to the management and protection of terrestrial biological resources in the  
9 study area. Each of these laws promotes consideration of wildlife and native vegetation either  
10 through comprehensive planning or through regulation of activities that may have an adverse  
11 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis  
12 for Alternative 1A, contains biological goals and objectives that have been developed to promote  
13 the species protection and natural resource conservation that are directed by these state laws.  
14 Alternative 1A conservation actions would be compatible with the policies and directives  
15 contained in these laws.
- 16 • *The Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the  
17 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the  
18 maintenance and protection of natural resources and the protection of agricultural land uses in  
19 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use  
20 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state  
21 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of  
22 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological  
23 goals and objectives would be compatible with these LURMP goals (Delta Protection  
24 Commission 2010).
- 25 • *The Suisun Marsh Preservation Act* of 1974 was designed to protect the Suisun Marsh for long-  
26 term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of  
27 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration  
28 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh  
29 Preservation Act.

### 30 **Plans, Programs, and Policies**

- 31 • *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the  
32 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:  
33 provide for a more reliable water supply for California and protect, restore, and enhance the  
34 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances  
35 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an  
36 evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta  
37 Stewardship Council will determine whether the BDCP is compatible with the goals and  
38 objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the  
39 BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.
- 40 • *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,  
41 promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and  
42 values in California. The BDCP conservation measures that provide for a significant expansion of  
43 wetland acreage and quality in the Delta and Suisun Marsh are compatible with the intent of the  
44 California Wetlands Conservation Policy.

- 1       • *The North American Waterfowl Management Plan (NAWMP) and Central Valley Joint Venture*  
2 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the  
3 major basins of California’s Central Valley. The NAWMP is a management plan jointly approved  
4 by the United States and Canada in 1986. It contains general guidance from the principal wildlife  
5 management agencies of the two countries for sustaining abundant waterfowl populations by  
6 conserving landscapes through self-directed partnerships (joint ventures) that are guided by  
7 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation  
8 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal  
9 government agencies, and one corporation that have formed a partnership to improve the  
10 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding  
11 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV’s  
12 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation  
13 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP  
14 Plan Area includes all or portions of three Implementation Plan basins—the Delta, Yolo and  
15 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland  
16 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and  
17 water supplies for wetland management, agricultural land enhancement, farmland easements  
18 that maintain waterfowl food resources on agricultural land, and farmland easements that  
19 buffer existing wetlands from urban and residential growth.

20       Implementation of the Alternative 1A conservation measures would result in significant  
21 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;  
22 however, significant increases in tidal and nontidal wetlands in these basins would be another  
23 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has  
24 included a large managed wetland conservation and enhancement goal for this area. For the  
25 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this  
26 EIR/EIS has added mitigation that would require food production studies and adaptive  
27 management to ensure that the Suisun basin would continue to provide the waterfowl and  
28 shorebird habitat envisioned in the Implementation Plan.

- 29       • *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*  
30 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*  
31 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan,* and  
32 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to  
33 preserve and enhance the natural resource and recreation qualities of these areas.  
34 Implementing Alternative 1A, especially construction of CM1 and CM2 facilities, and land  
35 modification associated with CM4 restoration activities, could create temporary disruptions to  
36 the terrestrial biological resource management activities in these management areas. The  
37 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the  
38 BDCP would be compatible with the long-term management goals of these areas. Proposed  
39 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed  
40 to be compatible with and to complement the current management direction for these areas and  
41 would be required to adapt restoration proposals to meet current policy established for  
42 managing these areas.
- 43       • *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the  
44 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term  
45 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh  
46 Preservation Act. The Suisun Marsh Preservation Agreement (SMPA) was signed in 1987 and

1 modified in 2005 by DWR, CDFW, Reclamation and the Suisun Resource Conservation District to  
2 establish the mitigation approach in the Marsh for effects of operating the SWP and CVP. The  
3 primary concerns were the effects of CVP and SWP Delta diversions on salinity in the Marsh. The  
4 SMPA focused on ways to ensure adequate water quality and quantity for the managed wetlands  
5 and wildlife habitats in the Marsh to assure equal waterfowl values in the Marsh. The Suisun  
6 Marsh Plan (SMP), for which a Final EIS/EIR was released in 2010 by these agencies, provides  
7 for restoration of tidal marsh habitat and enhancement of managed wetland in the Marsh,  
8 maintenance of waterfowl hunting and recreational opportunities in the Marsh, maintenance  
9 and improvement of the Marsh levee system, and protection and enhancement of water quality  
10 for beneficial uses of the Marsh. An integral component of the SMP is balancing continued  
11 managed wetland operation with new tidal wetland restoration to provide improved and  
12 greater habitat for fish and wildlife species. The SMP is a programmatic, long-term plan and  
13 does not include specific projects, project proponents, or funding mechanisms. However, the  
14 SMP relies on tidal restoration to allow for managed wetland operations to continue. The BDCP  
15 would provide a funding mechanism and increased management potential relative to existing  
16 and restored habitats, assisting the SMP in meeting its broader ecological goals, consistent with  
17 long-term operation of the SWP and CVP water conveyance facilities. The conservation actions  
18 contained in the BDCP, which are designed to ensure the long-term protection and recovery of  
19 special-status fish and wildlife species dependent on the Marsh, would be compatible with the  
20 water quality and habitat restoration goals of the SMPA and SMP.

- 21 ● *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive  
22 species. Implementation of the Plan's long-term control and management objectives affect  
23 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan  
24 objectives are to control and remove invasive aquatic species that are detrimental to native  
25 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be  
26 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative  
27 1A would, therefore, be compatible with the objectives of the California Aquatic Invasive Species  
28 Management Plan.
- 29 ● *Habitat Conservation Plans and Natural Community Conservation Plans* are the subject of a  
30 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP  
31 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

### 32 **Executive Orders**

- 33 ● *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland  
34 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the  
35 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 36 ● *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the  
37 introduction and spread of invasive species in a cost-effective and environmentally sound  
38 manner. Alternative 1A construction and restoration actions have the potential to both  
39 introduce and spread invasive species in the study area. Implementation of mitigation measures  
40 described in this chapter would be capable of making Alternative 1A implementation compatible  
41 with Executive Order 13112.
- 42 ● *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs  
43 federal agencies whose activities affect public land management, outdoor recreation, and  
44 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and

1 the management of game species and their habitat. Alternative 1A conservation measures that  
2 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and  
3 other natural communities would conflict with the hunting expansion and enhancement aspects  
4 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of  
5 alternatives on hunting opportunities. The habitat protection and expansion conservation  
6 measures of Alternative 1A would be compatible with the executive order's goal of facilitating  
7 the management of habitats for some game species.

8 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 1A  
9 identified in the analysis above indicate the potential for a physical consequence to the environment.  
10 The primary physical consequence of concern is the conversion of large acreages of cultivated land  
11 and managed wetland to natural wetland and riparian habitat in the study area. The physical effects  
12 are discussed in the *Shorebirds and Waterfowl* analysis above, and no additional CEQA conclusion is  
13 required related to the compatibility of the alternative with relevant plans and polices. The reader is  
14 referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of  
15 state and federal agencies to comply with local regulations, and for a discussion of the relationship  
16 between plan and policy consistency and physical consequences to the environment.

17

### 12.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)

Section 3.5.3 in Chapter 3, *Description of Alternatives*, fully describes Alternative 1B, and Figure 3-4 depicts the alternative.

#### Natural Communities

##### Tidal Perennial Aquatic

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

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

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

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	33	33	145	145	0	0
CM2	8	8	11	11	9-36	0
CM4	11	18	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>52</b>	<b>61</b>	<b>156</b>	<b>161</b>	<b>9-36</b>	<b>39</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

3

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

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
7 CM4, CM5, and CM6 would permanently affect an estimated 61 acres and temporarily remove 161  
8 acres of tidal perennial aquatic natural community in the study area. These modifications represent  
9 less than 1% of the 86,263 acres of the community that is mapped in the study area. The majority of  
10 the permanent and temporary effects would happen during the first 10 years of Alternative 1B  
11 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.  
12 Natural communities restoration would add 8,300 acres of tidal wetlands, including an estimated  
13 3,400 acres of tidal perennial aquatic natural community during the same period, which would  
14 expand the area of that habitat and offset the losses. The 3,400-acre increase is estimated, based on  
15 modeling reported in BDCP Appendix 3.B, Table 5, by comparing existing Plan Area subtidal habitat  
16 to near-term subtidal habitat with the Plan. The BDCP beneficial effects analysis (BDCP Chapter 5,  
17 Section 5.4.1.2) indicates that, while there would be no minimum restoration requirement for the  
18 tidal perennial aquatic natural community, an estimated approximately 27,000 acres of tidal  
19 perennial aquatic natural community would be restored based on tidal restoration modeling. This  
20 estimate is based on Table 5 in BDCP Appendix 3.B, subtracting late long-term acreage without  
21 project from late long-term acreage with project.

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

- 25 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1B water conveyance  
26 facilities would permanently remove 33 acres and temporarily remove 145 acres of tidal

1 perennial aquatic community. Most of the permanent loss would occur where Intakes 1–5  
2 encroach on the Sacramento River’s east bank between Freeport and Courtland (see Terrestrial  
3 Biology Mapbook, a support document to the EIS/EIR, for a detailed view of proposed facilities  
4 overlain on natural community mapping). The footings and the screens at the intake sites would  
5 be placed into the river margin and would displace moderately deep to shallow, flowing open  
6 water with a mud substrate and very little aquatic vegetation. Small areas of this community  
7 would also be lost to canal construction approximately 1.2 miles south of Hood Franklin Road  
8 and immediately west of Stone Lakes NWR (less than 1 acre), and at crossings of a canal and  
9 connecting slough just south of Lambert Road and west of the railroad tracks. The temporary  
10 effects on tidal perennial aquatic habitats would occur at numerous locations, including in the  
11 Sacramento River at Intakes 1–5, and at temporary siphon construction work areas where the  
12 canal would cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment  
13 Slough and Middle River just southeast of Victoria Canal. Tunnel work areas and transmission  
14 construction sites at the junction of the new canal and the new Byron Court Forebay would also  
15 temporarily affect West Canal, Grant Line Canal and Old River just south of Clifton Court  
16 Forebay. The details of these locations can be seen in the Terrestrial Biology Mapbook. These  
17 losses would take place during the near-term construction period.

- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
19 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
20 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
21 Sacramento Weir improvements. Some of these activities could involve excavation and grading  
22 in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on  
23 hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11  
24 acres could be temporarily removed. This activity would occur primarily in the near-term  
25 timeframe.
- 26 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
27 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.  
28 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,  
29 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent  
30 wetlands. Specific locations for these conversions are not known. The 18 acres could remain  
31 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one  
32 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been  
33 taken and the effect has been discussed simultaneously with the habitat losses associated with  
34 other conservation measures.

35 An estimated 65,000 acres of tidal wetlands and transitional uplands would be restored during  
36 tidal habitat restoration, consistent with BDCP Objective L1.3. Of these acres, an estimated  
37 27,000 acres of tidal perennial aquatic habitat would be restored, based on modeling conducted  
38 by ESA PWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*).  
39 This restoration would be consistent with BDCP Objective TPANC1.1. Approximately 3,400 acres  
40 of the restoration would happen during the first 10 years of Alternative 1B implementation,  
41 which would coincide with the timeframe of water conveyance facilities construction. The  
42 remaining restoration would be spread over the following 30 years. Tidal natural communities  
43 restoration is expected to be focused in the ROAs identified in Figure 12-1. Some of the  
44 restoration would occur in the lower Yolo Bypass, but restoration would also be spread among  
45 the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

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

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

#### 20 ***Near-Term Timeframe***

21 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
22 affect the tidal perennial aquatic community through CM1 construction losses (33 acres permanent  
23 and 145 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres  
24 temporary). The habitat would be lost primarily along the Sacramento River at intake sites, at  
25 slough crossings along the eastern canal alignment, or in the northern Yolo Bypass. Approximately  
26 11 acres of the inundation and construction-related effects resulting from CM4 would occur during  
27 the near-term throughout the ROAs mapped in Figure 12-1.

28 The construction losses of this special-status natural community would represent an adverse effect  
29 if they were not offset by avoidance and minimization measures and restoration actions associated  
30 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be  
31 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United  
32 States as defined by Section 404 of the CWA. The creation of approximately 3,400 acres of high-  
33 quality tidal perennial aquatic natural community as part of CM4 during the first 10 years of  
34 Alternative 1B implementation would offset this near-term loss, avoiding any adverse effect. Typical  
35 project-level mitigation ratios (1:1 for restoration) would indicate 248 acres of restoration would be  
36 needed to offset (i.e., mitigate) the 248 acres of effect (the total permanent and temporary near-term  
37 effects listed in Table 12-1B-1) associated with near-term activities, including water conveyance  
38 facilities construction.

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



1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1B as a whole would result in relatively minor (less than 1%)  
3 conversions or losses of tidal perennial aquatic community in the study area. These losses or  
4 conversions (101 acres of permanent and 161 acres of temporary loss) would be largely associated  
5 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish  
6 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions  
7 would occur over the course of the Plan's restoration activities at various tidal restoration sites  
8 throughout the study area. By the end of the Plan timeframe, a total of 27,000 acres of high-value  
9 tidal perennial aquatic natural community would be restored over a wide region of the study area,  
10 including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see  
11 Figure 12-1). The restoration acreage has been estimated from Table 5 in BDCP Appendix 3.B, *BDCP*  
12 *Tidal Habitat Evolution Assessment*.

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

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Alternative 1B would result in the loss or conversion of approximately 248 acres of tidal perennial  
22 aquatic natural community due to construction of the water conveyance facilities (CM1) and fish  
23 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The  
24 construction losses would be primarily along the Sacramento River at intake sites, at slough  
25 crossings during canal construction, and within the northern section of the Yolo Bypass, while  
26 inundation conversions would be at various tidal restoration sites throughout the study area. The  
27 losses and conversions would be spread across the 10-year near-term timeframe. These losses and  
28 conversions would be offset by planned restoration of an estimated 3,400 acres of high-value tidal  
29 perennial aquatic natural community scheduled for the first 10 years of Alternative 1B  
30 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to  
31 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts  
32 would be less-than-significant. Typical project-level mitigation ratios (1:1 for restoration) would  
33 indicate that 248 acres of restoration would be needed to offset (i.e., mitigate) the 248 acres of loss  
34 or conversion. The restoration would be initiated at the beginning of Alternative 1B implementation  
35 to minimize any time lag in the availability of this habitat to special-status species, and would result  
36 in a net gain in acreage of this sensitive natural community.

37 **Late Long-Term Timeframe**

38 At the end of the Plan period, 262 acres of the natural community would be lost or converted and an  
39 estimated 27,000 acres of this community would be restored. There would be no net permanent  
40 reduction in the acreage of this sensitive natural community within the study area. Therefore,  
41 Alternative 1B would not have a substantial adverse effect on this natural community; the impact  
42 would be beneficial.

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

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

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B  
10 would result in an increase in the frequency, magnitude and duration of inundation-related  
11 changes in water depth and velocity of 9–36 acres of tidal perennial aquatic natural community.  
12 The methods used to estimate these inundation acreages are described in BDCP Appendix 5.J,  
13 *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by  
14 inundation would vary with the flow volume that would pass through the newly-constructed  
15 notch in the Fremont Weir. The 9-acre increase in inundation would be associated with a notch  
16 flow of 1,000 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-  
17 related increases in flow through Fremont Weir would be expected in 30% of the years. Most of  
18 the tidal perennial aquatic community occurs in the southern section of the bypass on Liberty  
19 Island, and, to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe  
20 Drain. The anticipated change in management of flows in the Yolo Bypass includes more  
21 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some  
22 years, later releases into the bypass in spring months (April and May). The modification of  
23 periodic inundation events would be expected to be beneficial to the ecological function of tidal  
24 perennial aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo  
25 Bypass waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-  
26 2 and described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in  
27 the bypass would not substantially modify its value for special-status or common terrestrial  
28 species. Water depths and water flow rates would increase over Existing Conditions and the No  
29 Action condition in approximately 30% of the years, but it would not fragment the habitat or  
30 make it less accessible to special-status or common terrestrial species. The modifications would  
31 not result in a loss of this community. The plant species associated with this community are  
32 adapted to inundation. The extended inundation would be designed to expand foraging and  
33 spawning habitat for Delta fishes. The effects of these changes in the inundation regime on  
34 terrestrial species that rely on tidal perennial aquatic habitats are discussed in detail later in this  
35 chapter, under the individual species assessments.
- 36 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
37 increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic habitat.  
38 Specific locations for this restoration activity have not been identified, but they would likely be  
39 focused in the south Delta area, along the major rivers and Delta channels. The more frequent  
40 exposure of these wetlands to stream flooding events would be beneficial to the ecological  
41 function of tidal perennial aquatic habitats, especially as they relate to BDCP target aquatic  
42 species. The plant species associated with these tidal perennial aquatic areas are adapted to  
43 inundation and would not be substantially modified.

44 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected  
45 to more frequent increases in water depth and velocity as a result of implementing two Alternative

1 1B conservation measures (CM2 and CM5). Tidal perennial aquatic community is already, by  
2 definition, permanently inundated aquatic habitat of value to terrestrial and aquatic species in the  
3 study area; periodic inundation would not result in a net permanent reduction in the acreage of this  
4 community in the study area.

5 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community  
6 associated with Alternative 1B would not have an adverse effect on the community.

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

### 14 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 15 **Operation, Maintenance and Management Activities**

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

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

41 The periodic changes in flows in the Sacramento River, Feather River, and American River  
42 associated with Alternative 1B operations would affect salinity, water temperature, dissolved  
43 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta  
44 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially

1 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun  
2 Marsh as a result of increased export of Sacramento River water. These salinity changes are not  
3 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic  
4 natural community for terrestrial species in the study area.

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

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

- 42 • *Channel dredging.* Long-term operation of the Alternative 1B intakes on the Sacramento River  
43 would include periodic dredging of sediments that might accumulate in front of intake screens.  
44 The dredging would occur in tidal perennial aquatic natural community and would result in  
45 short-term increases in turbidity and disturbance of the substrate. These conditions would not  
46 eliminate the community, but would diminish its value for special-status and common species

1 that rely on it for movement corridor or foraging area. The individual species effects are  
2 discussed later in this chapter.

- 3 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
4 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a  
5 management plan would be prepared that specifies actions to improve the value of the habitats  
6 for covered species. Actions would include control of invasive nonnative plant and animal  
7 species, restrictions on vector control and application of herbicides, and maintenance of  
8 infrastructure that would allow for movement through the community. The enhancement efforts  
9 would improve the long-term value of this community for both special-status and common  
10 species.

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

23 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
24 Alternative 1B would not result in a net permanent reduction in the tidal perennial aquatic natural  
25 community within the study area. Therefore, there would be no adverse effect on this natural  
26 community.

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

#### 40 **Tidal Brackish Emergent Wetland**

41 Construction, operation, maintenance and management associated with the conservation  
42 components of Alternative 1B would have no adverse effect on the habitats associated with the tidal  
43 brackish emergent wetland natural community. Habitat restoration and construction associated  
44 with CM1, CM2, CM5 and CM6 would not remove tidal brackish emergent wetland; levee breaching

1 and minor construction associated with CM4 may temporarily remove small amounts of this natural  
2 community (see Table 12-1B-2). Full implementation of Alternative 1B would include the following  
3 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland  
4 natural community.

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

23 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
24 3.3 that would improve the value of tidal brackish emergent wetland natural community for  
25 terrestrial species. As explained below, with the restoration and enhancement of these amounts of  
26 habitat, in addition to implementation of AMMs, impacts on this natural community would not be  
27 adverse for NEPA purposes and would be less than significant for CEQA purposes.

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

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

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

3

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

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

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

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that  
2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee  
3 breaching and grading or contouring would increase opportunities for the introduction or spread of  
4 invasive species. Implementation of CM11 would limit this risk through invasive species control and  
5 wetland management and enhancement activities to support native species. Tidal flooding of dry  
6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific  
7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and  
8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,  
9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by  
10 managed wetlands. However, this has not been confirmed through comprehensive studies. Because  
11 of the difficulty in assessing this risk at a programmatic level, it will need to be considered at a  
12 project level. Site-specific restoration plans that address the creation and mobilization of mercury,  
13 and monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
14 be available to address the uncertainty of methylmercury levels in restored tidal marsh.

15 Water temperature fluctuations in newly created marsh and the potential for increased nitrogen  
16 deposition associated with construction vehicles are also issues of concern that are difficult to  
17 quantify at the current stage of restoration design. None of these effects is expected to limit the  
18 extent or value of tidal brackish emergent wetland in the study area.

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

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

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

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

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



1 channels would not result in the permanent reduction in acreage of tidal brackish emergent  
2 wetland natural community in the study area. Flow levels in the upstream rivers would not  
3 directly affect this natural community because it does not exist upstream of the Delta. Increased  
4 diversions of Sacramento River flows in the north Delta would not result in a permanent  
5 reduction in tidal brackish emergent wetland downstream of these diversions. Salinity levels in  
6 Suisun Marsh channels would be expected to increase with reduced Sacramento River outflows  
7 (see Chapter 8, Section 8.3.3.9), but this change would not be sufficient to change the acreage of  
8 brackish marsh. This natural community persists in an environment that experiences natural  
9 fluctuations in salinity due to tidal ebb and flow. Reduced diversions from the south Delta  
10 channels would not create a reduction in this natural community.

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

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

- 42 ● *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP  
43 actions has the potential to require removal of adjacent vegetation and could entail earth and  
44 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil  
45 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal  
46 erosion, turbidity and runoff control management practices, including those developed as part

1 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
2 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic  
3 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation  
4 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
5 adverse effects on this community.

- 6 ● *Vegetation management*. Vegetation management in the form of physical removal and chemical  
7 treatment would be a periodic activity associated with the long-term maintenance of restoration  
8 sites (*CM11 Natural Communities Enhancement and Management*). Use of herbicides to control  
9 nuisance vegetation could pose a long-term hazard to tidal brackish emergent wetland natural  
10 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
11 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or  
12 direct discharge of herbicides to wetland areas being treated for invasive species removal.  
13 Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*  
14 have been made part of the BDCP to reduce hazards to humans and the environment from use of  
15 various chemicals during maintenance activities, including the use of herbicides. These  
16 commitments are described in Appendix 3B, including the commitment to prepare and  
17 implement spill prevention, containment, and countermeasure plans and stormwater pollution  
18 prevention plans. Best management practices, including control of drift and runoff from treated  
19 areas, and use of herbicides approved for use in aquatic environments would also reduce the  
20 risk of affecting natural communities adjacent to levees associated with tidal wetland  
21 restoration activities.
- 22 ● *Channel dredging*. Long-term maintenance of tidal channels that support wetland expansion in  
23 Suisun Marsh would include periodic dredging of sediments. The dredging would take place  
24 adjacent to tidal brackish emergent wetland natural community and would result in short-term  
25 increases in turbidity and disturbance of the substrate. These conditions would not eliminate  
26 the community, but would diminish its value in the short term for special-status and common  
27 species that rely on it for cover, movement corridor or foraging area. The individual species  
28 effects are discussed later in this chapter.
- 29 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural  
30 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural  
31 community, a management plan would be prepared that specifies actions to improve the value  
32 of the habitats for covered species. Actions would include control of invasive nonnative plant  
33 and animal species, fire management, restrictions on vector control and application of  
34 herbicides, and maintenance of infrastructure that would allow for movement through the  
35 community. The enhancement efforts would improve the long-term value of this community for  
36 both special-status and common species.

37 The various operations and maintenance activities described above could alter acreage and value of  
38 tidal brackish emergent wetland natural community in the study area through water operations,  
39 levee and road maintenance, channel dredging and vegetation management in or adjacent to this  
40 community. Activities could also introduce sediment and herbicides that would reduce the value of  
41 this community to common and sensitive plant and wildlife species. Other periodic activities  
42 associated with the Plan, including management, protection and enhancement actions associated  
43 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
44 *Enhancement and Management*, would be undertaken to enhance the value of the community. While  
45 some of these activities could result in small changes in acreage, these changes would be greatly  
46 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The

1 management actions associated with levee repair, periodic dredging and control of invasive plant  
2 species would also result in a long-term benefit to the species associated with tidal brackish  
3 emergent wetland habitats by improving water movement.

4 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
5 Alternative 1B would not result in a net permanent reduction in the tidal brackish emergent wetland  
6 natural community within the study area. There would be no adverse effect on the tidal brackish  
7 emergent wetland natural community.

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

#### 21 **Tidal Freshwater Emergent Wetland**

22 Construction, operation, maintenance and management associated with the conservation  
23 components of Alternative 1B would have no long-term adverse effects on the habitats associated  
24 with the tidal freshwater emergent wetland natural community. Initial development and  
25 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary  
26 removal of small acreages of this community(see Table 12-1B-3). Full implementation of Alternative  
27 1B would also include the following conservation actions over the term of the BDCP to benefit the  
28 tidal freshwater emergent wetland natural community.

- 29 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
30 accommodate sea level rise (Objective L1.3 associated with CM4).
- 31 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient  
32 transitional uplands along the fringes of restored brackish and freshwater tidal emergent  
33 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future  
34 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with  
35 CM4).
- 36 ● Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of  
37 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6 and/or 7 (Objective  
38 TFEWNC1.1, associated with CM4).
- 39 ● Restore tidal freshwater emergent wetlands in areas that increase connectivity among  
40 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 41 ● Restore and sustain a diversity of marsh vegetation that reflects historical species compositions  
42 and high structural complexity (Objective TFEWNC2.1, associated with CM4).

- Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2, associated with CM4).

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	8	8	11	11	0	0
CM2	6	6	0	0	24-58	0
CM4	1	1	0	0	0	0
CM5	0	1	0	1	0	3
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>15</b>	<b>16</b>	<b>11</b>	<b>12</b>	<b>24-58</b>	<b>3</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

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

Construction and land grading activities that would accompany the implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 16 acres and temporarily remove 12 acres of tidal freshwater emergent wetland natural community in the study area. These modifications represent less than 1% of the 8,856 acres of the community that is mapped in the study area. The majority of the permanent and temporary losses would happen during the first 10 years of Alternative 1B implementation, as water conveyance facilities are constructed and habitat restoration is initiated. Natural communities restoration would add at least 24,000 acres of high value tidal freshwater emergent wetland natural community during the course of the Plan restoration activities, which would expand the area of that habitat and offset the losses. The BDCP beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the implementation of *CM4 Tidal Natural Communities Restoration* would restore at least 24,000 acres of tidal freshwater emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the

1 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South  
2 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan  
3 would promote vegetation diversity and structural complexity (as incorporated into the restoration  
4 design) in restored tidal freshwater marsh. These same conservation activities would be  
5 implemented under Alternative 1B.

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

- 9
- 10 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance  
11 facilities would permanently remove 8 acres and temporarily remove 11 acres of tidal  
12 freshwater emergent wetland community. Permanent losses would occur as a result of  
13 constructing the east canal. Small areas of emergent wetland would be removed where the canal  
14 would cross manmade channels just south of Hood and at Lambert Road in the north Delta.  
15 Permanent losses would also occur at canal crossings of Beaver Slough and a channel just north  
16 of White Slough in the east Delta. The temporary losses would be associated primarily with  
17 siphon construction where the canal would cross White Slough, Disappointment Slough, and  
18 Middle River just south of Victoria Canal. Small temporary losses would also occur where a  
19 tunnel would be constructed under Old River just north of its junction with Victoria Canal, and  
20 where transmission lines would be constructed south of the new forebay adjacent to Clifton  
21 Court Forebay. Refer to the Terrestrial Biology Mapbook to see the details of these locations.  
22 These losses would take place during the near-term construction period.

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

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

- 38 • *CM4 Tidal Natural Communities Restoration:* Based on hypothetical footprints of this restoration  
39 activity, initial land grading and levee modification could permanently remove 1 acre of tidal  
40 freshwater emergent wetland natural community. This loss would occur during the near-term  
41 timeframe throughout the ROAs identified for tidal wetland restoration. At the same time, an  
42 estimated 24,000 acres of tidal freshwater emergent wetland community would be restored  
43 during tidal habitat restoration, consistent with BDCP Objective TFEWNC1.1, associated with  
44 CM4. Approximately 8,850 acres of the restoration would occur during the first 10 years of  
45 BDCP implementation, which would coincide with the timeframe of water conveyance facilities  
construction. The remaining restoration would be spread over the following 30 years. Tidal

1 wetland communities restoration is expected to be focused in the ROAs identified in Figure 12-1.  
2 Restoration would be located and designed to improve habitat connectivity (Objective  
3 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in  
4 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would happen in the  
5 lower Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,  
6 Cosumnes/Mokelumne and West Delta ROAs.

- 7 ● The restoration activities associated with CM4 in the Plan Area ROAs would result in other  
8 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances  
9 associated with levee breaching and grading or contouring would increase opportunities for the  
10 introduction or spread of invasive species. Implementation of CM11 would limit this risk  
11 through invasive species control and wetland management and enhancement activities to  
12 support native species. Flooding of dry areas for tidal freshwater marsh creation could also  
13 increase the bioavailability of methylmercury, especially in the Cache Slough,  
14 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the  
15 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty  
16 in assessing this risk at a programmatic level, it will need to be considered at a project level.  
17 Site-specific restoration plans that address the creation and mobilization of mercury, and  
18 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
19 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water  
20 temperature fluctuations in newly created marsh is also an issue of concern that is difficult to  
21 quantify at the current stage of restoration design. None of these effects is expected to limit the  
22 extent or value of tidal freshwater emergent wetland in the study area.  
23 *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction would permanently remove 1  
24 acre and temporarily remove 1 acre of tidal freshwater emergent wetland habitat. The  
25 construction-related losses would be considered a permanent removal of the habitats directly  
26 affected. The majority of seasonally inundated floodplain restoration is expected to be  
27 implemented along the lower San Joaquin River in the south and central Delta areas. Floodplain  
28 restoration along the San Joaquin River would improve connectivity for a variety of species that  
29 rely on freshwater marsh and riparian habitats. The regional and Plan Area landscape linkages  
30 along the San Joaquin River are included in Figure 12-2. This activity is scheduled to start  
31 following construction of water conveyance facilities, which is expected to take 10 years.
- 32 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
33 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and  
34 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
35 enhancement activity would take place on narrow strips of habitat, including levees and channel  
36 banks. The improvements would occur within the study area on sections of the Sacramento, San  
37 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

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

#### 41 ***Near-Term Timeframe***

42 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
43 affect the tidal freshwater emergent wetland natural community through CM1 construction losses  
44 (8 acres permanent and 11 acres temporary), CM2 construction losses (6 acres permanent), and  
45 CM4 construction losses (1 acre permanent). The tidal freshwater emergent wetland natural

1 community would be lost in the north Delta near Hood, in the east Delta at various slough crossings,  
2 in the south Delta near the new forebay, and at various locations within the Yolo Bypass and the  
3 tidal restoration ROAs.

4 The construction losses of this special-status natural community would represent an adverse effect  
5 if they were not offset by avoidance and minimization measures and restoration actions associated  
6 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community  
7 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
8 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater  
9 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 1B  
10 implementation would offset this near-term loss, avoiding any adverse effect. Typical project-level  
11 mitigation ratios (1:1 for restoration) would indicate that 26 acres of restoration would be needed  
12 to offset (i.e., mitigate) the 26 acres of loss (the total permanent and temporary near-term effects  
13 listed in Table 12-1B-3).

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

#### 20 **Late Long-Term Timeframe**

21 Implementation of Alternative 1B as a whole would result in relatively minor (less than 1%) losses  
22 of tidal freshwater emergent wetland community in the study area. These losses (16 acres of  
23 permanent and 12 acres of temporary loss) would be largely associated with construction of the  
24 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee  
25 modification and land grading for tidal marsh restoration (CM4) and floodplain restoration (CM5).  
26 The CM4 and CM5 losses would occur during the course of the CM4 and CM5 conservation actions at  
27 various tidal and floodplain restoration sites throughout the study area. By the end of the Plan  
28 timeframe, a total of 24,000 acres of this natural community would be restored over a wide region of  
29 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Slough, and South  
30 Delta ROAs (see Figure 12-1).

31 **NEPA Effects:** The creation of 8,850 acres of tidal freshwater emergent wetland natural community  
32 as part of CM4 during the first 10 years of BDCP implementation would offset the construction and  
33 inundation-related effects of implementing CM1, CM2, CM4 and CM5, avoiding any adverse effect in  
34 the near-term. Because of the 24,000 acres of tidal freshwater emergent wetland restoration that  
35 would occur over the course of the Plan, Alternative 1B would not result in a net long-term  
36 reduction in the acreage of a sensitive natural community; the effect would be beneficial.

#### 37 **CEQA Conclusion:**

#### 38 **Near-Term Timeframe**

39 Alternative 1B would result in the near-term loss of approximately 26 acres of tidal freshwater  
40 emergent wetland natural community due to construction of the water conveyance facilities (CM1)  
41 and fish passage improvements (CM2), tidal marsh restoration (CM4), and floodplain restoration  
42 (CM5). The construction losses would occur in the north Delta near Hood, in the east Delta at several  
43 slough crossings and in the south Delta at the new forebay. The losses would be spread across a 10-

1 year near-term timeframe and would be offset by planned restoration of 8,850 acres of tidal  
2 freshwater emergent wetland natural community scheduled for the first 10 years of Alternative 1B  
3 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to  
4 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts  
5 would be less-than-significant. Typical project-level mitigation ratios (1:1 for restoration) would  
6 indicate that 26 acres of restoration would be needed to offset (i.e., mitigate) the 26 acres of loss  
7 (the combination of the near-term permanent and temporary losses included in Table 12-1A-3). The  
8 restoration would be initiated at the beginning of Alternative 1B implementation to minimize any  
9 time lag in the availability of this habitat to special-status species, and would result in a net gain in  
10 acreage of this sensitive natural community.

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

12 At the end of the Plan period, 28 acres of tidal freshwater emergent wetland natural community  
13 would be lost to conservation activities, and 24,000 acres of this community would be restored.  
14 There would be no net permanent reduction in the acreage of this sensitive natural community  
15 within the study area. Therefore, Alternative 1B would not have a substantial adverse effect on this  
16 natural community; the impact would be beneficial.

### 17 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 18 **Freshwater Emergent Wetland Natural Community**

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

- 26 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B  
27 would result in an increase in the frequency, magnitude and duration of inundation of 24–58  
28 acres of tidal freshwater emergent wetland natural community. The methods used to estimate  
29 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
30 *Wildlife, and Plants*. The area more frequently inundated would vary with the flow volume that  
31 would pass through the newly-constructed notch in the Fremont Weir. The 24-acre increase in  
32 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the  
33 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
34 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in  
35 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic  
36 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate  
37 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent  
38 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,  
39 later releases into the bypass in spring months (April and May). The modification of periodic  
40 inundation events would not adversely affect the ecological function of tidal freshwater  
41 emergent wetland habitats and would not substantially modify its value for special-status or  
42 common terrestrial species. The plants in this natural community are adapted to periodic  
43 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant  
44 species are described in detail in later sections of this chapter.



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

9 In summary, 27–61 acres of tidal freshwater emergent wetland natural community in the study area  
10 would be subjected to more frequent inundation as a result of implementing two Alternative 1B  
11 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a  
12 habitat of great value to both terrestrial and aquatic species in the study area, and increases in  
13 inundation for relatively short periods of time would not reduce the acreage or the value of this  
14 community.

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

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

#### 24 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 25 **Ongoing Operation, Maintenance and Management Activities**

26 Once the physical facilities associated with BDCP Alternative 1B are constructed and the stream flow  
27 regime associated with changed water management is in effect, there would be new ongoing and  
28 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
29 conservation lands that could affect tidal freshwater emergent wetland natural community in the  
30 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,  
31 and reduced diversions from south Delta channels. These actions are associated with CM1 (see  
32 Impact BIO-7 for effects associated with CM2). The periodic actions would involve access road and  
33 conveyance facilities repair, vegetation management at the various water conveyance facilities and  
34 habitat restoration sites (CM11), levee and canal repair and replacement of levee armoring, channel  
35 dredging, and habitat enhancement in accordance with natural community management plans. The  
36 potential effects of these actions are described below.

- 37 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
38 *Delta channels*. Reduced diversions from the south Delta channels would not create a reduction  
39 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows  
40 in the Sacramento River, Feather River, and American River associated with modified reservoir  
41 operations, and the increased diversion of Sacramento River flows at north Delta intakes  
42 associated with Alternative 1B would affect salinity, water temperature, dissolved oxygen levels,  
43 turbidity, contaminant levels and dilution capacity in these rivers and Delta waterways. These  
44 changes are discussed in detail in Chapter 8, *Water Quality*. Potentially substantial increases in

1 electrical conductivity (salinity) are predicted for the west Delta and Suisun Marsh as a result of  
2 these changed water operations. These salinity changes may alter the plant composition of tidal  
3 freshwater emergent wetland along the lower Sacramento and San Joaquin Rivers and west  
4 Delta islands. The severity and extent of these salinity changes would be complicated by  
5 anticipated sea level rise and the effects of downstream tidal restoration over the life of the Plan.  
6 There is the potential that some tidal freshwater marsh may become brackish. These potential  
7 changes are not expected to result in a significant reduction in the acreage and value of tidal  
8 freshwater emergent wetland natural community in the study area.

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

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

- 40 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
41 conveyance facilities and levees associated with the BDCP actions have the potential to require  
42 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal  
43 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,  
44 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal  
45 erosion, turbidity and runoff control management practices, including those developed as part  
46 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*

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

- 5        ● *Vegetation management*. Vegetation management, in the form of physical removal and chemical  
6        treatment, would be a periodic activity associated with the long-term maintenance of water  
7        conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
8        *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
9        tidal freshwater emergent wetland natural community at or adjacent to treated areas. The  
10       hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
11       stormwater onto the natural community, or direct discharge of herbicides to tidal aquatic areas  
12       being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
13       *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce  
14       hazards to humans and the environment from use of various chemicals during maintenance  
15       activities, including the use of herbicides. These commitments are described in Appendix 3B,  
16       including the commitment to prepare and implement spill prevention, containment, and  
17       countermeasure plans and stormwater pollution prevention plans. Best management practices,  
18       including control of drift and runoff from treated areas, and use of herbicides approved for use  
19       in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
20       water conveyance features and levees associated with restoration activities.
- 21       ● *Channel dredging*. Long-term operation of the Alternative 1B intakes on the Sacramento River  
22       would include periodic dredging of sediments that might accumulate in front of intake screens.  
23       The dredging would be done in waterways adjacent to tidal freshwater emergent wetlands and  
24       would result in short-term increases in turbidity and disturbance of the substrate. These  
25       conditions would not eliminate the community, but would diminish its value for special-status  
26       and common species that rely on it for cover or foraging area. The individual species effects are  
27       discussed later in this chapter.
- 28       ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural  
29       communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a  
30       management plan would be prepared that specifies actions to improve the value of the habitats  
31       for covered species. Actions would include control of invasive nonnative plant and animal  
32       species, fire management, restrictions on vector control and application of herbicides, and  
33       maintenance of infrastructure that would allow for movement through the community. The  
34       enhancement efforts would improve the long-term value of this community for both special-  
35       status and common species.

36       The various operations and maintenance activities described above could alter acreage of tidal  
37       freshwater emergent wetland natural community in the study area through changes in flow patterns  
38       and resultant changes in water quality. Activities could also introduce sediment and herbicides that  
39       would reduce the value of this community to common and sensitive plant and wildlife species. Other  
40       periodic activities associated with the Plan, including management, protection and enhancement  
41       actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
42       *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
43       community. While some of these activities could result in small changes in acreage, these changes  
44       would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*  
45       *Restoration*. The management actions associated with levee repair, periodic dredging and control of

1 invasive plant species would also result in a long-term benefit to the species associated with tidal  
2 freshwater emergent wetland habitats by improving water movement.

3 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
4 Alternative 1B would not result in a net permanent reduction in the tidal freshwater emergent  
5 wetland natural community within the study area. Therefore, there would be no adverse effect on  
6 this natural community.

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

### 21 **Valley/Foothill Riparian**

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

- 29 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
30 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
31 with CM7).
- 32 ● Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7  
33 by year 10 (Objective VFRNC1.2, associated with CM3).
- 34 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
35 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
36 with CM5 and CM7).
- 37 ● Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,  
38 associated with CM3 and CM7).
- 39 ● Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-  
40 to late-successional riparian vegetation (VFRNC2.2,) in large blocks with a minimum patch size  
41 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and  
42 CM7).

- Maintain or increase abundance and distribution of valley/foothill riparian natural community vegetation alliances that are rare or uncommon as recognized by California Department of Fish and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance (Objective VFRNC3.1).

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	51	51	39	39	0	0
CM2	89	89	88	88	51–92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>438</b>	<b>735</b>	<b>127</b>	<b>162</b>	<b>51–92</b>	<b>266</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

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

Construction, land grading and habitat restoration activities that would accompany the implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 735 acres and temporarily remove 162 acres of valley/foothill riparian natural community in the study area. These modifications represent approximately 5% of the 17,966 acres of the community that is mapped in the study area. The majority of the permanent and temporary losses would happen during the first 10 years of Alternative 1B implementation, as water conveyance facilities are constructed and habitat restoration is initiated. Valley/foothill riparian protection (750 acres) and restoration (800 acres) would be initiated during the same period. By the end of the Plan period, 5,000 acres of this natural community would be restored. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of Alternative 4 would restore or

1 create 5,000 acres of riparian forest and scrub in Conservation Zones 1, 2, 4, 5, 6, and 7, with at least  
2 3,000 acres occurring on restored seasonally inundated floodplain. Alternative 4 would also protect  
3 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7. These  
4 conservation measures would also be implemented under Alternative 1B.

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

- 8 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1B water conveyance  
9 facilities would permanently remove 51 acres and temporarily remove 39 acres of  
10 valley/foothill riparian natural community. The habitat would be removed at multiple locations  
11 from the north Delta to the east Delta and in the vicinity of Clifton Court Forebay. Almost all of  
12 the losses would occur on the borders of waterways. In the north Delta, most of the permanent  
13 loss would occur where Intakes 1–5 encroach on the Sacramento River’s east bank between  
14 Freeport and Courtland. The riparian areas here are very small patches, some dominated by  
15 valley oak and others by nonnative trees and scrub vegetation (see Terrestrial Biology  
16 Mapbook). Other small patches or narrow bands of riparian vegetation dominated by valley oak,  
17 willow, cottonwood or mixed brambles would be permanently removed by canal construction  
18 adjacent to Intake 1, between Intakes 2 and 4, and just south of Lambert Road. In the east Delta,  
19 small permanent losses would occur from canal construction just south of Twin Cities Road and  
20 just north of Walnut Grove Road. A small area of riparian habitat (mostly blackberries) would be  
21 permanently removed in the south Delta at the new forebay construction site. The temporary  
22 riparian losses would occur at the intake sites along the Sacramento River and at temporary  
23 siphon work areas where the canal would cross Beaver Slough, Hog Slough, Sycamore Slough,  
24 White Slough, Disappointment Slough, Railroad Canal, and Middle River just south of Victoria  
25 Canal. Tunnel construction at Old River just south of Victoria Canal would also temporarily  
26 remove mixed willows and brambles. These losses would take place during the near-term  
27 construction period.
- 28 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
29 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
30 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
31 Sacramento Weir improvements. All of these activities could involve excavation and grading in  
32 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on  
33 hypothetical construction footprints, a total of 89 acres could be permanently lost and another  
34 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end  
35 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of  
36 valley oak, sycamore, cottonwood and willow trees. The riparian areas here are primarily small,  
37 disconnected patches with moderate to low value as wildlife movement corridors. Most of these  
38 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and  
39 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would  
40 occur primarily in the near-term timeframe.
- 41 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
42 footprints, implementation of CM4 would permanently inundate or remove 552 acres of  
43 valley/foothill riparian community. The losses would be spread among most of the ROAs  
44 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh  
45 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,  
46 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation

1 dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP  
2 Chapter 5, Section 5.4.5.1.1). The actual loss of riparian habitat to marsh restoration would be  
3 expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration  
4 projects were identified and planned, sites could be selected that avoid riparian areas as much  
5 as possible.

- 6 ● *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration levee construction  
7 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill  
8 riparian natural community. The construction-related losses would be considered a permanent  
9 removal of the habitats directly affected. These losses would be expected to occur along the San  
10 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to  
11 start following construction of water conveyance facilities, which is expected to take 10 years.
- 12 ● *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in  
13 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
14 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
15 activity would occur along waterway margins where riparian habitat stringers exist, including  
16 levees and channel banks. The improvements would occur within the study area on sections of  
17 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 18 ● *CM7 Riparian Natural Community Restoration:* The valley/foothill riparian natural community  
19 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)  
20 restoration and channel margin enhancements. Following community-specific goals and  
21 objectives in the Plan, a total of 5,000 acres of this community would be restored (BDCP  
22 Objective VFRNC1.1) and 750 acres would be protected (BDCP Objective VFRNC1.2) over the life  
23 of the Plan. Approximately 800 acres would be restored and the entire 750 acres would be  
24 protected during the first 10 years of Plan implementation. Riparian restoration and protection  
25 would be focused in CZ 4 and CZ 7 (BDCP Objective VFRNC2.3), with a goal of adding a 500-acre  
26 portion of the restoration in one or the other of these zones. A variety of successional stages  
27 would also be sought to benefit the variety of sensitive plant and animal species that rely on this  
28 natural community in the study area (BDCP Objective VFRNC2.4).

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

### 32 ***Near-Term Timeframe***

33 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
34 affect the valley/foothill riparian natural community through CM1 construction losses (51 acres  
35 permanent and 39 acres temporary) and the CM2 construction losses (89 acres permanent and 88  
36 acres temporary). The natural community would be lost primarily along the eastern bank of the  
37 Sacramento River at intake sites, along the eastern canal route in the northern and eastern Delta  
38 areas, in the vicinity of the new forebay construction site in the south Delta, and in the northern Yolo  
39 Bypass. Approximately 298 acres of the inundation and construction-related loss from CM4 would  
40 occur during the near-term throughout the ROAs mapped in Figure 12-1.

41 The construction losses of this special-status natural community would represent an adverse effect  
42 if they were not offset by avoidance and minimization measures and protection/restoration actions  
43 associated with BDCP conservation components. Loss of valley/foothill riparian natural community  
44 would be considered a loss in acreage of a sensitive natural community, and could be considered a

1 loss of wetlands as defined by Section 404 of the CWA. Most of the losses would be in small patches  
2 or narrow strips along waterways, with limited structural complexity. The restoration of 800 acres  
3 and protection (including significant enhancement) of 750 acres of valley/foothill riparian natural  
4 community as part of CM7 and CM3 during the first 10 years of BDCP implementation would  
5 minimize this near-term loss, avoiding an adverse effect. At least 400 acres of the protection is  
6 planned for the first 5 years of Alternative 1B implementation. The restoration areas would be large  
7 areas providing connectivity with existing riparian habitats and would include a variety of trees and  
8 shrubs to produce structural complexity. Typical project-level mitigation ratios (1:1 for restoration  
9 and 1:1 for protection) would indicate that 565 acres of protection and 565 acres of restoration  
10 would be needed to offset (i.e., mitigate) the 565 acres of loss (the combination of permanent and  
11 temporary losses in the near-term listed in Table 12-1B-4). The combination of the two approaches  
12 (protection and restoration) is designed to avoid a temporal lag in the value of riparian habitat  
13 available to sensitive species.

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

#### 20 **Late Long-Term Timeframe**

21 Implementation of Alternative 1B as a whole would result in 6% losses of valley/foothill riparian  
22 community in the study area. These losses (735 acres of permanent and 162 acres of temporary  
23 loss) would be largely associated with construction of the water conveyance facilities (CM1),  
24 construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh  
25 restoration (CM4). Inundation losses would occur during the course of the Plan's restoration  
26 activities at various tidal restoration sites throughout the study area. By the end of the Plan  
27 timeframe, a total of 5,000 acres of this natural community would be restored and 750 acres would  
28 be protected (CM7 and CM3, respectively). The restoration would occur primarily in CZ 4 and CZ 7,  
29 in the Cosumnes/ Mokelumne and South Delta ROAs (see Figure 12-1).

30 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of  
31 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10  
32 years of BDCP implementation would minimize the near-term loss of this community, avoiding any  
33 adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and protection of 750  
34 acres of valley/foothill riparian natural community during the course of the Plan, Alternative 1B  
35 would not result in a net long-term reduction in the acreage of a sensitive natural community; the  
36 effect would be beneficial.

#### 37 **CEQA Conclusion:**

##### 38 **Near-Term Timeframe**

39 Alternative 1B would result in the near-term loss of approximately 565 acres of valley/foothill  
40 riparian natural community due to construction of the water conveyance facilities (CM1) and fish  
41 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The natural  
42 community would be lost primarily along the Sacramento River at intake sites, along the eastern  
43 canal route in the northern and eastern Delta areas, in the vicinity of the new forebay construction



1 site in the south Delta, and within the northern section of the Yolo Bypass, while inundation losses  
2 would occur at various tidal restoration sites throughout the study area. The construction losses  
3 would be spread across a 10-year near-term timeframe. These losses would be minimized by  
4 planned restoration of 800 acres (CM7) and protection (including significant enhancement) of 750  
5 acres (CM3) of valley/foothill riparian natural community scheduled for the first 10 years of BDCP  
6 implementation. At least 400 acres of the protection is planned for the first 5 years of Plan  
7 implementation. AMM1, AMM2, AMM6, AMM7, AMM10 and AMM18 would also be implemented to  
8 minimize impacts. Because of these near-term restoration and protection activities and AMMs,  
9 impacts would be less-than-significant. Typical project-level mitigation ratios (1:1 for protection  
10 and 1:1 for restoration) would indicate that 565 acres of protection and 565 acres of restoration  
11 would be needed to offset (i.e., mitigate) the 565 acres of loss. The combination of the two  
12 approaches (protection and restoration) is designed to avoid a temporal lag in the value of riparian  
13 habitat available to sensitive species. The restoration would be initiated at the beginning of Plan  
14 implementation to minimize any time lag in the availability of this habitat to special-status species,  
15 and would result in a net gain in acreage of this sensitive natural community.

### 16 **Late Long-Term Timeframe**

17 At the end of the Plan period, 897 acres of valley/foothill riparian natural community would be  
18 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and  
19 750 acres would be protected. There would be no net permanent reduction in the acreage of this  
20 sensitive natural community within the study area. Therefore, Alternative 1B would not have a  
21 substantial adverse effect on this natural community; the impact on the valley/foothill riparian  
22 natural community would be beneficial.

### 23 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 24 **Valley/Foothill Riparian Natural Community**

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

- 31 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B  
32 would result in an increase in the frequency, magnitude and duration of inundation of 51–92  
33 acres of valley/foothill riparian natural community. The area more frequently inundated would  
34 vary with the flows that would be passed through the newly-constructed notch in the Fremont  
35 Weir. The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be  
36 created by a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages  
37 are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. These  
38 increased flow conditions would be expected to occur in no more than 30% of all years (see  
39 BDCP Chapter 5, Section 5.4.1.2). The valley/foothill riparian community occurs throughout the  
40 bypass, including a large acreage just below Fremont Weir in the north end of the bypass. There  
41 are other riparian habitat areas on Liberty Island, and, to a lesser extent, along the eastern and  
42 western edges of the bypass, including along the Tule Canal/Toe Drain, the west side channels  
43 and the Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass  
44 includes more frequent releases in flows into the bypass from the Fremont and Sacramento

1 Weirs, and in some years, later releases into the bypass in spring months (April and May). The  
2 modification of periodic inundation events would not adversely affect riparian habitats, as they  
3 have persisted under similar high flows and extended inundation periods in the Yolo Bypass.  
4 The effects of this inundation on wildlife and plant species are described in detail in later  
5 sections of this chapter.

- 6 • *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration would result in an  
7 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian  
8 habitats. Specific locations for this restoration activity have not been identified, but they would  
9 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see  
10 Figure 3-1). The reconnection of riparian vegetation to periodic stream flooding events would  
11 be beneficial to the ecological function of this natural community, especially in the germination  
12 and establishment of native riparian plants as flood scour increases.

13 In summary, from 317 to 368 acres of valley/foothill riparian community in the study area would be  
14 subjected to more frequent inundation as a result of implementing two Alternative 1B conservation  
15 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits  
16 from periodic inundation; therefore, periodic inundation would not result in a net permanent  
17 reduction in the acreage of this community in the study area. The increased inundation would create  
18 a beneficial effect on the community as it relates to germination and establishment of native riparian  
19 plants.

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

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

### 29 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 30 **Operation, Maintenance and Management Activities**

31 Once the physical facilities associated with BDCP Alternative 1B are constructed and the stream flow  
32 regime associated with changed water management is in effect, there would be new ongoing and  
33 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
34 conservation lands that could affect valley/foothill riparian natural community in the study area.  
35 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
36 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of  
37 reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-10 for effects  
38 associated with CM2). The periodic actions would involve access road and conveyance facility  
39 repair, vegetation management at the various water conveyance facilities and habitat restoration  
40 sites (CM13), levee and canal repair and replacement of levee armoring, channel dredging, and  
41 habitat enhancement in accordance with natural community management plans. The potential  
42 effects of these actions are described below.

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

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

- 42       ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
43       conveyance facilities and levees associated with the BDCP actions have the potential to require  
44       removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian  
45       habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these  
46       habitats. These activities would be subject to normal erosion, turbidity and runoff control

1 management practices, including those developed as part of *AMM2 Construction Best*  
2 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
3 vegetation removal or earthwork adjacent to or within riparian habitats would require use of  
4 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*  
5 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would  
6 avoid permanent adverse effects on this community.

- 7 ● *Vegetation management*. Vegetation management, in the form of physical removal and chemical  
8 treatment, would be a periodic activity associated with the long-term maintenance of water  
9 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
10 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
11 valley/foothill riparian natural community at or adjacent to treated areas. The hazard could be  
12 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
13 onto the natural community, or direct discharge of herbicides to riparian areas being treated for  
14 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment*  
15 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and  
16 the environment from use of various chemicals during maintenance activities, including the use  
17 of herbicides. These commitments are described in Appendix 3B, including the commitment to  
18 prepare and implement spill prevention, containment, and countermeasure plans and  
19 stormwater pollution prevention plans. Best management practices, including control of drift  
20 and runoff from treated areas, and use of herbicides approved for use in terrestrial  
21 environments would also reduce the risk of affecting natural communities adjacent to water  
22 conveyance features and levees associated with restoration activities.
- 23 ● *Channel dredging*. Long-term operation of the Alternative 1B intakes on the Sacramento River  
24 would include periodic dredging of sediments that might accumulate in front of intake screens.  
25 The dredging could occur adjacent to valley/foothill riparian natural community. This activity  
26 should not adversely affect riparian plants as long as dredging equipment is kept out of riparian  
27 areas and dredge spoil is disposed of outside of riparian corridors.
- 28 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural  
29 communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a  
30 management plan would be prepared that specifies actions to improve the value of the habitats  
31 for covered species. Actions would include control of invasive nonnative plant and animal  
32 species, fire management, restrictions on vector control and application of herbicides, and  
33 maintenance of infrastructure that would allow for movement through the community. The  
34 enhancement efforts would improve the long-term value of this community for both special-  
35 status and common species.
- 36 ● *Recreation*. The BDCP would allow for certain types of recreation in and adjacent to  
37 valley/foothill riparian natural community in the reserve system. The activities could include  
38 wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*  
39 *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable  
40 restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an  
41 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
42 activities that might affect this natural community. Priority would be given to use of existing  
43 trails and roads, with some potential for new trails. Limited tree removal and limb trimming  
44 could also be involved.

1 The various operations and maintenance activities described above could alter acreage of  
2 valley/foothill riparian natural community in the study area through changes in flow patterns and  
3 resultant changes in water quality. Activities could also introduce sediment and herbicides that  
4 would reduce the value of this community to common and sensitive plant and wildlife species.  
5 Recreation activities could encroach on riparian areas and require occasional tree removal. Other  
6 periodic activities associated with the Plan, including management, protection and enhancement  
7 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
8 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
9 community. While some of these activities could result in small changes in acreage, these changes  
10 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*  
11 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or  
12 minimized by implementation of AMM2, AMM4, AMM5, AMM10, AMM18 and AMM37. The  
13 management actions associated with levee repair, periodic dredging and control of invasive plant  
14 species would also result in a long-term benefit to the species associated with riparian habitats by  
15 improving water movement in adjacent waterways and by eliminating competitive, invasive species  
16 of plants.

17 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
18 Alternative 1B would not result in a net permanent reduction in the valley/foothill riparian natural  
19 community within the study area. Therefore, there would be no adverse effect on this community.

20 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would  
21 have the potential to create minor changes in total acreage of valley/foothill riparian natural  
22 community in the study area, and could create temporary increases in turbidity and sedimentation.  
23 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
24 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, AMM18 and  
25 AMM37 would minimize these impacts, and other operations and maintenance activities, including  
26 management, protection and enhancement actions associated with *CM3 Natural Communities*  
27 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
28 create positive effects, including reduced competition from invasive, nonnative plants in these  
29 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural*  
30 *Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this  
31 natural community in the study area. Ongoing operation, maintenance and management activities  
32 would not result in a net permanent reduction in this sensitive natural community within the study  
33 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural  
34 community.

### 35 **Nontidal Perennial Aquatic**

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

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

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	19	19	5	5	0	0
CM2	24	24	12	12	50-77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>77</b>	<b>260</b>	<b>17</b>	<b>33</b>	<b>50-77</b>	<b>25</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

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

Construction and land grading activities that would accompany the implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 260 acres and temporarily remove 33 acres of nontidal perennial aquatic natural community in the study area. These modifications represent approximately 5% of the 5,567 acres of the community that is mapped in the study area. Approximately one-third (94 acres) of the permanent and temporary losses would occur during the first 10 years of BDCP implementation, as water conveyance facilities are constructed and habitat restoration is initiated. Natural communities restoration (CM10) would add 400 acres of nontidal marsh during the same period, which would expand the area of that habitat and offset the losses. The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and nontidal freshwater perennial emergent wetland natural communities, as specified in Objective NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.6.2) indicates

1 that implementation of Alternative 4 would result in the restoration of 1,200 acres of nontidal  
2 marsh, and that the restoration would occur in blocks that would be contiguous with the Plan's  
3 larger reserve system. The nontidal marsh would be restored in the vicinity of giant garter snake  
4 subpopulations identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998).  
5 The same conservation actions would be implemented for Alternative 1B.

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

- 9 ● *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance  
10 facilities would permanently remove 19 acres and temporarily remove 5 acres of nontidal  
11 perennial aquatic community. The permanent losses would occur where the new canal would  
12 cross existing irrigation canals at the junction of Blossom Road and West Peltier Road, and just  
13 south of Sycamore Slough, and where it would eliminate a small slough just south of the San  
14 Joaquin River at its junction with Fourteen Mile Slough. These locations are all in the east Delta.  
15 The temporary losses would occur where nontidal canals or sloughs would be affected at canal  
16 siphon construction sites adjacent to Hog Slough, Sycamore Slough and Railroad Cut (see  
17 Terrestrial Biology Mapbook). These losses would take place during the near-term construction  
18 period.
- 19 ● *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 would involve a number of  
20 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
21 stilling basin improvements, west side channels modifications, Putah Creek realignment  
22 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could  
23 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish  
24 through the bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
25 permanently lost and another 12 acres could be temporarily removed. This activity would occur  
26 primarily in the near-term timeframe.
- 27 ● *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
28 footprints, implementation of CM4 would permanently change to tidally influenced inundation  
29 or remove 189 acres of nontidal perennial aquatic community. These losses would be expected  
30 to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An  
31 estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the  
32 restoration (CM10) would occur during the first 10 years of BDCP implementation, which would  
33 coincide with the timeframe of water conveyance facilities construction and early restoration  
34 activities. The remaining restoration would be spread over the following 30 years. Nontidal  
35 natural communities restoration is expected to be focused in CZs 2, 4 and/or 5 in Figure 12-1.
- 36 ● *CM5 Seasonally Inundated Floodplain Restoration:* Based on theoretical footprints, floodplain  
37 restoration levee construction would permanently remove 28 acres and temporarily remove 16  
38 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered  
39 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain  
40 restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration  
41 along the southern Delta rivers would improve connectivity for a variety of species that rely on  
42 aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San  
43 Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled  
44 to start following construction of water conveyance facilities, which is expected to take 10 years.

- 1 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
2 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The  
3 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity  
4 would be on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
5 Nontidal marsh adjacent to these tidal areas could be affected. Channel margin would be  
6 enhanced within the study area on sections of the Sacramento, San Joaquin and Mokelumne  
7 Rivers, and along Steamboat and Sutter Sloughs.
- 8 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal  
9 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic  
10 and nontidal freshwater perennial emergent natural communities. This marsh restoration  
11 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and  
12 would be accompanied by adjacent grassland restoration or protection.

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

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

17 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
18 affect the nontidal perennial aquatic community through CM1 construction losses (19 acres  
19 permanent and 5 acres temporary) and the CM2 construction losses (24 acres permanent and 12  
20 acres temporary). The natural community would be lost at scattered locations along the canal  
21 construction corridor in the east and south Delta and along the west side channels and channels  
22 associated with the Sacramento and Lisbon Weirs in the Yolo Bypass. Approximately 34 acres of the  
23 inundation and construction-related losses from CM4 would occur during the near-term throughout  
24 several of the ROAs mapped in Figure 12-1.

25 The construction losses of this special-status natural community would represent an adverse effect  
26 if they were not offset by avoidance and minimization measures and restoration actions associated  
27 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would  
28 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the  
29 United States as defined by Section 404 of the CWA. However, the creating 400 acres of nontidal  
30 marsh as part of CM10 during the first 10 years of BDCP implementation would offset this near-term  
31 loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1  
32 for protection) would indicate 94 acres of restoration and 94 acres of protection would be needed to  
33 offset (i.e., mitigate) the 94 acres of loss. While the Plan does not include protection of nontidal  
34 perennial aquatic habitat, it includes well in excess of the typical 1:1 restoration acreage (which  
35 includes protection in perpetuity), and therefore compensates for the lack of protection.

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



1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1B as a whole would result in relatively minor (5%) losses of  
3 nontidal perennial aquatic community in the study area. These losses (260 acres of permanent and  
4 31 acres of temporary loss) would be largely associated with construction of the water conveyance  
5 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced  
6 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The changes to  
7 tidally influenced inundation would occur during the course of the CM4 restoration activities at  
8 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of  
9 1,200 acres of nontidal marsh would be restored over a wide region of the study area, including  
10 within the Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see Figure 12-1).

11 **NEPA Effects:** During the first 10 years of implementing Alternative 1B, creating 400 acres of  
12 nontidal marsh as part of CM10 would offset the construction-related and inundation losses of 94  
13 acres of nontidal perennial aquatic natural community. There would be no adverse effect. During the  
14 full duration of Plan implementation, Alternative 1B would not result in a net reduction in the  
15 acreage of a sensitive natural community; there would be an expansion of nontidal marsh and the  
16 effect would be beneficial.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Alternative 1B would result in the loss of approximately 94 acres of nontidal perennial aquatic  
20 natural community due to construction of the water conveyance facilities (CM1) and fish passage  
21 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration  
22 (CM4). The natural community would be lost at scattered locations along the canal construction  
23 corridor in the east and south Delta and along the west side channels and channels associated with  
24 the Sacramento and Lisbon Weirs in the Yolo Bypass. The losses would be spread across a 10-year  
25 near-term timeframe. These losses would be offset by planned restoration of 400 acres of nontidal  
26 marsh scheduled for the first 10 years of BDCP implementation (CM10). Also, AMM1, AMM2, AMM6,  
27 AMM7, and AMM10 would be implemented to minimize impacts. Because of these offsetting near-  
28 term restoration activities and AMMs, impacts would be less than significant. Typical project-level  
29 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 94 acres of  
30 restoration and 94 acres of protection would be needed to offset (i.e., mitigate) the 94 acres of loss.  
31 While the Plan does not include protection in the near-term, it includes well in excess of the typical  
32 1:1 restoration acreage (which includes protection in perpetuity), and therefore compensates for  
33 the lack of protection. The restoration would be initiated at the beginning of Alternative 1B  
34 implementation to minimize any time lag in the availability of this habitat to special-status species,  
35 and would result in a net gain in acreage of this sensitive natural community.

36 **Late Long-Term Timeframe**

37 At the end of the Plan period, 293 acres of the natural community would be removed and 1,200  
38 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal  
39 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There  
40 would be no net permanent reduction in the acreage of this sensitive natural community within the  
41 study area. Therefore, Alternative 1B would not have a substantial adverse effect on this natural  
42 community; the impact on the nontidal perennial aquatic natural community would be beneficial.

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

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

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

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

43 **NEPA Effects:** The increased inundation of nontidal perennial aquatic natural community in the Yolo  
44 Bypass and along south Delta waterways would not reduce the acreage of this natural community

1 and could encourage germination of aquatic vegetation. This increased inundation would not be  
2 adverse.

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

### 11 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing** 12 **Operation, Maintenance and Management Activities**

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

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

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

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

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

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

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

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

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

### 32 **Nontidal Freshwater Perennial Emergent Wetland**

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

- 40 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
41 and nontidal freshwater perennial emergent wetland natural communities (Objective  
42 NFEW/NPANC1.1, associated with CM10).
- 43 ● Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting  
44 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.

1 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent  
2 vegetation (Objective TRBL1.1).

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	5	5	6	6	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>70</b>	<b>129</b>	<b>7</b>	<b>7</b>	<b>6-8</b>	<b>8</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

11

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

14 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
15 CM4, and CM6 would permanently eliminate an estimated 129 acres and temporarily remove 7  
16 acres of nontidal freshwater perennial emergent wetland natural community in the study area.  
17 These modifications represent approximately 9% of the 1,509 acres of the community that is  
18 mapped in the study area. Approximately 57% (77 acres) of the permanent and temporary losses  
19 would happen during the first 10 years of BDCP implementation, as water conveyance facilities are  
20 constructed and habitat restoration is initiated. Natural communities restoration (CM10) would add  
21 1,200 acres of nontidal marsh, consistent with BDCP Objective NFEW/NPANC1.1, and natural  
22 communities protection (CM3) would protect 50 acres of nontidal marsh, consistent with BDCP  
23 Objective TRBL1.1. These actions would be taken over the course of BDCP marsh restoration  
24 activities, which would expand the area of that habitat and offset the losses. The nontidal marsh

1 restoration would include a mosaic of nontidal perennial aquatic and nontidal freshwater perennial  
2 emergent wetland natural communities. The nontidal marsh protection would be designed to  
3 support tricolored blackbird populations in the study area. The BDCP beneficial effects analysis  
4 (BDCP Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the  
5 restoration of 1,200 acres of nontidal marsh. The restoration would occur in blocks that would be  
6 contiguous with the alternative's larger reserve system. The nontidal marsh would be restored in  
7 the vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.  
8 Fish and Wildlife Service 1998). These conservation actions would also be implemented under  
9 Alternative 1B.

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

- 13 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance  
14 facilities would permanently remove 5 acres and temporarily remove 6 acres of tidal freshwater  
15 perennial emergent wetland community. The permanent loss would occur where the new canal  
16 would cross a small channel with emergent wetland just south of the San Joaquin River and  
17 adjacent to North Holt Road, immediately west of Stockton. The temporary loss would occur  
18 where temporary siphon and railroad work areas would displace emergent wetlands in and  
19 adjacent to Railroad Cut at Holt (see Terrestrial Biology Mapbook). These wetlands are  
20 extremely small and remote water bodies. These losses would take place during the near-term  
21 construction period.
- 22 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of  
23 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
24 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek  
25 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of  
26 these activities could involve excavation and grading in nontidal freshwater perennial emergent  
27 wetland areas to improve passage of fish through the bypasses. Based on hypothetical  
28 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be  
29 temporarily removed. These losses would most likely occur in the Tule Canal and west side  
30 channels at the north end of the bypass. The habitat here includes narrow bands within these  
31 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow  
32 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity  
33 would occur in the near-term timeframe.
- 34 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
35 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal  
36 freshwater perennial emergent wetland community. These losses would be expected to occur  
37 primarily in the Cache Slough ROA (see Figure 12-1). An estimated 1,200 acres of nontidal  
38 marsh would be restored (CM10) and 50 acres would be protected (CM3) during nontidal  
39 habitat conservation actions. Approximately 400 acres of the restoration and 25 acres of the  
40 protection would happen during the first 10 years of BDCP implementation, which would  
41 coincide with the timeframe of water conveyance facilities construction and early tidal marsh  
42 restoration. The remaining restoration would be spread over the following 30 years. Nontidal  
43 marsh natural communities restoration is expected to be focused in the vicinity of giant garter  
44 snake populations in the eastern Delta and near the Yolo Bypass. *CM5 Seasonally Inundated  
45 Floodplain Restoration:* Based on theoretical footprints, floodplain restoration levee construction  
46 would not affect nontidal freshwater perennial emergent wetland natural community.

- 1 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
2 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of  
3 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
4 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including  
5 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The  
6 improvements would occur within the study area on sections of the Sacramento, San Joaquin  
7 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 8 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal  
9 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic  
10 and nontidal freshwater perennial emergent natural communities. This marsh restoration  
11 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and  
12 would be accompanied by adjacent grassland restoration or protection.

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

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

17 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
18 affect the nontidal freshwater perennial emergent wetland community through CM1 construction  
19 losses (5 acres permanent and 6 acres temporary) and the CM2 construction losses (25 acres  
20 permanent and 1 acre temporary). These losses would occur along the eastern canal route just south  
21 of the San Joaquin River and adjacent to North Holt Road, and just north of Holt in the south Delta,  
22 and in the Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses  
23 from CM4 would occur in the near-term. These losses would occur throughout several of the ROAs  
24 mapped in Figure 12-1.

25 The construction losses of this special-status natural community would represent an adverse effect  
26 if they were not offset by avoidance and minimization measures and restoration actions associated  
27 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland  
28 natural community would be considered both a loss in acreage of a sensitive natural community and  
29 a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400  
30 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first  
31 10 years of BDCP implementation would offset this near-term loss, avoiding any adverse effect.  
32 Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate 77  
33 acres of restoration and 77 acres of protection would be needed to offset (i.e., mitigate) the 77 acres  
34 of loss (the combination of temporary and permanent near-term losses included in Table 12-1B-6).  
35 While the Plan includes just 25 acres of protection in the near-term, it includes in excess of the  
36 typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore  
37 compensates for the shortfall in protection.

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



1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1B as a whole would result in 9% losses of nontidal freshwater  
3 perennial emergent wetland community in the study area. These losses (129 acres of permanent  
4 and 7 acres of temporary loss) would be associated with construction of the water conveyance  
5 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal  
6 marsh restoration (CM4). Inundation losses would occur during the course of the CM4 restoration  
7 activities at various tidal restoration sites throughout the study area. By the end of the Plan  
8 timeframe, a total of 1,200 acres of nontidal marsh would be restored and 50 acres would be  
9 protected. The restoration would occur near giant garter snake occupied habitat in the eastern Delta  
10 and near Yolo Bypass, in CZs 2, 4 and 5. The 50 acres of protection would occur in CZ 1, 2, 8 or 11 to  
11 provide nesting habitat for tri-colored blackbird(see Figure 12-1).

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

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Alternative 1B would result in the loss of approximately 77 acres of nontidal freshwater perennial  
22 emergent wetland natural community due to construction of the water conveyance facilities (CM1)  
23 and fish passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The  
24 construction losses would occur along the eastern canal route at and just north of Holt in the south  
25 Delta, and in the Yolo Bypass. Approximately 40 acres of the inundation and construction-related  
26 losses from CM4 would occur in the near-term. These losses would occur throughout several of the  
27 ROAs mapped in Figure 12-1.

28 The losses would be spread across a 10-year near-term timeframe. These losses would be offset by  
29 planned restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first  
30 10 years of BDCP implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and AMM10  
31 would also be implemented to minimize impacts. Because of these offsetting near-term restoration  
32 activities and AMMs, impacts would be less-than-significant. Typical project-level mitigation ratios  
33 (1:1 for restoration and 1:1 for protection) would indicate that 77 acres of restoration and 77 acres  
34 of protection would be needed to offset (i.e., mitigate) the 77 acres of loss. While the Plan includes  
35 just 25 acres of protection in the near-term, it includes well in excess of the typical 1:1 restoration  
36 acreage (which includes protection in perpetuity), and therefore compensates for the shortfall in  
37 protection. The restoration and protection would be initiated at the beginning of Alternative 1B  
38 implementation to minimize any time lag in the availability of this habitat to special-status species,  
39 and would result in a net gain in acreage of this sensitive natural community.

40 **Late Long-Term Timeframe**

41 At the end of the Plan period, 136 acres of the natural community would be removed and 1,200  
42 acres of nontidal marsh would be restored. There would be no net permanent reduction in the  
43 acreage of the nontidal freshwater perennial emergent wetland natural community within the study

1 area. Therefore, Alternative 1B would not have a substantial adverse effect on this natural  
2 community; the impact would be beneficial.

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

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

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

1 In summary, 14-16 acres of nontidal freshwater perennial emergent wetland community in the  
2 study area would be subjected to more frequent inundation as a result of implementing two  
3 Alternative 1B conservation measures (CM2 and CM5). This community would not be adversely  
4 affected because its habitats in the Yolo Bypass have developed under a long-term regime of  
5 periodic inundation events and inundation along expanded river floodplains would be infrequent.

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

10 **CEQA Conclusion:** An estimated 16-18 acres of nontidal freshwater perennial emergent wetland  
11 community in the study area would be subjected to more frequent inundation as a result of  
12 implementing CM2 and CM5 under Alternative 1B. This community would not be significantly  
13 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of  
14 periodic inundation events and inundation along expanded river floodplains would be infrequent.  
15 The periodic inundation would not result in a net permanent reduction in the acreage of this  
16 community in the study area. Therefore, there would be no substantial adverse effect on the  
17 community. The impact would be less than significant.

#### 18 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural** 19 **Community from Ongoing Operation, Maintenance and Management Activities**

20 Once the physical facilities associated with BDCP Alternative 1B are constructed and the stream flow  
21 regime associated with changed water management is in effect, there would be new ongoing and  
22 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
23 conservation lands that could affect nontidal freshwater perennial emergent wetland natural  
24 community in the study area. The ongoing actions include modified operation of upstream  
25 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from  
26 south Delta channels. These actions are associated with CM1 (see Impact BIO-16 for effects  
27 associated with CM2). The periodic actions would involve access road and conveyance facility  
28 repair, vegetation management at the various water conveyance facilities and habitat restoration  
29 sites (CM13), levee and canal repair and replacement of levee armoring, channel dredging, and  
30 habitat enhancement in accordance with natural community management plans. The potential  
31 effects of these actions are described below.

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

1 nontidal freshwater perennial emergent wetland community downstream of these diversions.  
2 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of  
3 the river is tidally influenced. Reduced diversions from the south Delta channels would not  
4 create a reduction in this natural community.

- 5 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
6 conveyance facilities and levees associated with the BDCP actions have the potential to require  
7 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater  
8 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity  
9 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to  
10 normal erosion, turbidity and runoff control management practices, including those developed  
11 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
12 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic  
13 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation  
14 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
15 adverse effects on this community.
- 16 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
17 treatment, would be a periodic activity associated with the long-term maintenance of water  
18 conveyance facilities and restoration sites(*CM11 Natural Communities Enhancement and*  
19 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
20 nontidal freshwater perennial emergent wetland natural community at or adjacent to treated  
21 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of  
22 contaminated stormwater onto the natural community, or direct discharge of herbicides to  
23 nontidal perennial wetland areas being treated for invasive species removal. Environmental  
24 commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan* have been  
25 made part of the BDCP to reduce hazards to humans and the environment from use of various  
26 chemicals during maintenance activities, including the use of herbicides. These commitments  
27 are described in Appendix 3B, including the commitment to prepare and implement spill  
28 prevention, containment, and countermeasure control plans and stormwater pollution  
29 prevention plans. Best management practices, including control of drift and runoff from treated  
30 areas, and use of herbicides approved for use in aquatic environments would also reduce the  
31 risk of affecting natural communities adjacent to water conveyance features and levees  
32 associated with restoration activities.

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

- 43 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
44 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland  
45 natural community, a management plan would be prepared that specifies actions to improve the  
46 value of the habitats for covered species. Actions would include control of invasive nonnative

1 plant and animal species, fire management, restrictions on vector control and application of  
2 herbicides, and maintenance of infrastructure that would allow for movement through the  
3 community. The enhancement efforts would improve the long-term value of this community for  
4 both special-status and common species.

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

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

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

### 36 **Alkali Seasonal Wetland Complex**

37 Construction, operation, maintenance, and management associated with the conservation  
38 components of Alternative 1B would have no long-term adverse effects on the habitats associated  
39 with the alkali seasonal wetland complex natural community. Initial development and construction  
40 of CM2 and CM4 would result in permanent removal of this community(see Table 12-1B-7). Full  
41 implementation of Alternative 1B would also include the following conservation actions over the  
42 term of the BDCP to benefit the alkali seasonal wetland natural community.

- 1 • Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a  
2 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with  
3 CM3).
- 4 • Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no  
5 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)  
6 (Objective ASWNC1.2, associated with CM3 and CM9).
- 7 • Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
8 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>58</b>	<b>72</b>	<b>0</b>	<b>0</b>	<b>264-744</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

17

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

20 Construction, land grading and habitat restoration activities that would accompany the  
21 implementation of CM2 and CM4 would permanently eliminate an estimated 72 acres of alkali  
22 seasonal wetland complex natural community in the study area. These modifications represent  
23 approximately 2% of the 3,723 acres of the community that is mapped in the study area. Most of the

1 losses (58 acres or 80%) would occur during the first 10 years of Alternative 1B implementation, as  
2 Yolo Bypass improvements and habitat restoration is initiated. Alkali seasonal wetland complex  
3 protection (120 acres) and restoration (an estimated 58 acres, but determined by actual level of  
4 effect) would be initiated during the same period; when combined, these actions would offset the  
5 losses. By the end of the Plan period, 150 acres of this natural community would be protected and  
6 up to 72 acres would be restored. The BDCP beneficial effects analysis for this community (BDCP  
7 Chapter 5, Section 5.4.7.2) states that Alternative 4 would protect 150 acres of alkali seasonal  
8 wetland in Conservation Zones 1, 8, or 11, in a mosaic of protected grasslands and vernal pool  
9 complex. This would protect currently unprotected high-value alkali seasonal wetland complex in  
10 the Plan Area. The same conservation actions would be implemented for Alternative 1B.

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

- 14 ● *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance  
15 facilities would not directly affect alkali seasonal wetland complex natural community.

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

- 29 ● *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of  
30 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
31 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
32 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and  
33 grading in alkali seasonal wetland complex as a new channel is constructed. Based on  
34 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex  
35 is located immediately south of the existing Putah Creek channel within the bypass, and is a  
36 relatively large, moderate to high value, contiguous expanse of this community. This loss would  
37 occur in the near-term timeframe.

- 38 ● *CM3 Natural Communities Protection and Restoration:* CM3 proposes to protect at least 150 acres  
39 of alkali seasonal wetland complex in CZ 1, CZ 8 and CZ 11 (BDCP Objective ASWNC1.1). The  
40 protection would occur in areas containing a mosaic of grassland and vernal pool complex in  
41 unfragmented natural landscapes supporting a diversity of native plant and wildlife species.  
42 These areas would be both protected and enhanced to increase the cover of alkali seasonal  
43 wetland plants relative to nonnative species.

- 44 ● *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
45 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali

1 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the  
2 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh  
3 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in  
4 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.  
5 These losses would not fragment the alkali seasonal wetland communities adjacent to these  
6 sloughs because the losses would occur on the edges of the existing habitat.

- 7 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal  
8 pool complex and alkali seasonal wetland complex restoration goals. The intent of the  
9 conservation measure is to match the acreage of restoration with the actual acreage lost to other  
10 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal  
11 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of  
12 the BDCP's restoration period. The goal is for no net loss of this natural community, consistent  
13 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA  
14 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat  
15 connectivity goals mapped in Figure 12-2 and described in Table 3.2-3 of BDCP Chapter 3.

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

### 19 ***Near-Term Timeframe***

20 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
21 affect the alkali seasonal wetland complex natural community through CM2 construction losses (45  
22 acres). These losses would occur in the Yolo Bypass south of Putah Creek. Approximately 13 acres of  
23 the inundation and construction-related losses in habitat from CM4 would occur in the near-term.  
24 These losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped in Figure  
25 12-1.

26 The construction losses of this special-status natural community would represent an adverse effect  
27 if they were not offset by avoidance and minimization measures and restoration actions associated  
28 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community  
29 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
30 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland  
31 complex as part of CM3 and the restoration of up to 58 acres of this community as part of CM9  
32 during the first 10 years of BDCP implementation would offset this near-term loss, avoiding any  
33 adverse effect. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)  
34 would indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e.,  
35 mitigate) the 58 acres of loss.

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

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

42 Implementation of Alternative 1B as a whole would result in 2% losses of alkali seasonal wetland  
43 natural community in the study area. These losses (72 acres) would be largely associated with



1 construction of Yolo Bypass fish improvements (CM2) and inundation during tidal marsh  
2 restoration (CM4). Inundation losses would occur during the course of the Plan's restoration  
3 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

4 **NEPA Effects:** In the first 10 years of implementing Alternative 1B conservation measures, 120 acres  
5 of alkali seasonal wetland complex would be protected and up to 58 acres would be restored. These  
6 conservation actions would offset the near-term losses associated with construction and restoration  
7 actions of CM2 and CM4, avoiding any adverse effect. By the end of the Plan timeframe, a total of 150  
8 acres of this natural community would be protected (BDCP Objective ASWCNC 1.1 and CM3) and an  
9 estimated 72 acres would be restored (BDCP Objective ASWNC1.2 and CM9). The protection and  
10 restoration would occur primarily in CZ 1, CZ 8, and/or CZ 11, in the Cache Slough, Suisun Marsh  
11 and Clifton Court Forebay areas. Therefore, Alternative 1B would not have an adverse effect on this  
12 natural community.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Alternative 1B would result in the permanent loss of approximately 58 acres of alkali seasonal  
16 wetland complex natural community due to construction of fish passage improvements (CM2) and  
17 inundation during tidal marsh restoration (CM4). The construction losses would occur primarily in  
18 the area just south of Putah Creek in the Yolo Bypass, while inundation losses would occur in the  
19 Cache Slough and Suisun Marsh ROAs. The losses would be spread across a 10-year near-term  
20 timeframe.

21 The construction losses of this special-status natural community would represent an adverse effect  
22 if they were not offset by avoidance and minimization measures and other actions associated with  
23 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would  
24 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
25 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland  
26 complex as part of CM3 and the restoration of up to 58 acres of this community as part of CM9  
27 during the first 10 years of BDCP implementation would offset this near-term loss, avoiding any  
28 significant impact. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)  
29 would indicate 116 acres of protection and 58 acres or restoration would be needed to offset (i.e.,  
30 mitigate) the 58 acres of loss. AMM1, AMM2, AMM3, AMM4, and AMM10 would also be implemented  
31 to minimize impacts. Because of the offsetting protection and restoration activities and AMMs,  
32 impacts would be less than significant.

33 **Late Long-Term Timeframe**

34 At the end of the Plan period, 72 acres of alkali seasonal wetland complex natural community would  
35 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres  
36 would be restored. The restoration acres actually developed would depend on the number of acres  
37 affected during Plan implementation. There would be no net permanent reduction in the acreage of  
38 this natural community within the study area. Therefore, Alternative 1B would have a less-than-  
39 significant impact on this natural community.

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

3 BDCP conservation measure CM2 would modify the inundation/flooding regime of the Yolo Bypass,  
4 a man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat  
5 for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland  
6 complex natural community at scattered locations in the central and southern sections of the  
7 bypass.

8 Operation of the Yolo Bypass under Alternative 1B would result in an increase in the frequency and  
9 duration of inundation on an estimated 264–744 acres of alkali seasonal wetland complex natural  
10 community. The methods used to estimate these inundation acreages are described in BDCP  
11 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected  
12 by inundation would vary with the flow volume that would pass through the newly-constructed  
13 notch in the Fremont Weir. The 264-acre increase in inundation would be associated with a notch  
14 flow of 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a notch flow of  
15 4,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the  
16 years. The alkali seasonal wetland complex natural community occurs primarily in the central and  
17 southern reaches of the bypass, south of Putah Creek. The stands in this location are relatively large,  
18 with moderate to high value for associated plant and wildlife species. The anticipated change in  
19 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass  
20 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring  
21 months (April and May).

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

27 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural  
28 community in the Yolo Bypass would be subjected to more frequent inundation as a result of  
29 implementing CM2 under Alternative 1B. This natural community is conditioned to periodic  
30 inundation; the slight increase in periodic inundation would not result in a net permanent reduction  
31 in the acreage of this community in the study area, although some change in plant species  
32 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural  
33 community in the Yolo Bypass would have a less-than-significant impact on this community. The  
34 effects of this inundation on terrestrial wildlife and plant species are described in detail in later  
35 sections of this chapter.

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

38 Once the physical facilities associated with BDCP Alternative 1B are constructed and the stream flow  
39 regime associated with changed water management is in effect, there would be new ongoing and  
40 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
41 conservation lands that could affect alkali seasonal wetland complex natural community in the study  
42 area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,  
43 reduced diversions from south Delta channels, and recreation in and adjacent to Plan reserves.  
44 These actions are associated with CM1 and CM11 (see the impact discussion above for effects

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

- 6 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
7 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
8 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
9 channels (associated with Operational Scenario A) would not affect alkali seasonal wetland  
10 natural community. This natural community does not exist within or adjacent to the active  
11 Sacramento River system channels and Delta waterways that would be affected by modified  
12 flow levels.
- 13 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
14 conveyance facilities and levees associated with the BDCP actions have the potential to require  
15 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali  
16 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff  
17 entering these habitats. These activities would be subject to normal erosion and runoff control  
18 management practices, including those developed as part of *AMM2 Construction Best*  
19 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
20 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats  
21 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces  
22 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper  
23 implementation of these measures would avoid permanent adverse effects on this community.
- 24 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
25 treatment, would be a periodic activity associated with the long-term maintenance of water  
26 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
27 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
28 alkali seasonal wetland complex natural community at or adjacent to treated areas. The hazard  
29 could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
30 stormwater onto the natural community, or direct discharge of herbicides to alkali seasonal  
31 wetland complex areas being treated for invasive species removal. Environmental commitments  
32 and *AMM5 Spill Prevention, Containment and Countermeasure Plan* have been made part of the  
33 BDCP to reduce hazards to humans and the environment from use of various chemicals during  
34 maintenance activities, including the use of herbicides. These commitments are described in  
35 Appendix 3B, including the commitment to prepare and implement spill prevention,  
36 containment, and countermeasure plans and stormwater pollution prevention plans. Best  
37 management practices, including control of drift and runoff from treated areas, and use of  
38 herbicides approved for use in terrestrial environments would also reduce the risk of affecting  
39 natural communities adjacent to water conveyance features and levees associated with  
40 restoration activities.
- 41 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
42 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural  
43 community, a management plan would be prepared that specifies actions to improve the value  
44 of the habitats for covered species. Actions would include control of invasive nonnative plant  
45 and animal species, fire management, restrictions on vector control and application of  
46 herbicides, and maintenance of infrastructure that would allow for movement through the

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

- 3 • **Recreation.** The BDCP would allow for certain types of recreation in and adjacent to alkali  
4 seasonal wetland natural community in the reserve system. The activities could include wildlife  
5 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP  
6 Chapter 3, Section 3.4.11) describes this program and identifies applicable restrictions on  
7 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an  
8 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
9 activities that might affect this natural community. Most recreation would be docent-led wildlife  
10 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails  
11 would be constructed.

12 The various operations and maintenance activities described above could alter acreage of alkali  
13 seasonal wetland complex natural community in the study area. Activities could introduce sediment  
14 and herbicides that would reduce the value of this community to common and sensitive plant and  
15 wildlife species. Other periodic activities associated with the Plan, including management,  
16 protection and enhancement actions associated with *CM3 Natural Communities Protection and  
17 Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
18 enhance the value of the community. While some of these activities could result in small changes in  
19 acreage, these changes would be offset by protection and restoration activities planned as part of  
20 *CM3 Natural Communities Protection and Restoration*, and *CM9 Vernal Pool and Alkali Seasonal  
21 Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10,  
22 and AMM37. The management actions associated with control of invasive plant species would also  
23 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats  
24 by eliminating competitive, invasive species of plants.

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

28 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would  
29 have the potential to create minor changes in total acreage of alkali seasonal wetland complex  
30 natural community in the study area, and could create temporary increases sedimentation. The  
31 activities could also introduce herbicides periodically to control nonnative, invasive plants.  
32 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, and AMM37  
33 would minimize these impacts, and other operations and maintenance activities, including  
34 management, protection and enhancement actions associated with *CM3 Natural Communities  
35 Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
36 create positive effects, including reduced competition from invasive, nonnative plants in these  
37 habitats. Long-term restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal  
38 Wetland Complex Restoration* and protection actions associated with *CM3 Natural Communities  
39 Protection and Restoration* would ensure that the acreage of this natural community would not  
40 decrease in the study area. Ongoing operation, maintenance and management activities would not  
41 result in a net permanent reduction in this natural community within the study area. Therefore,  
42 there would be a less-than-significant impact.

**Vernal Pool Complex**

Construction, operation, maintenance and management associated with the Alternative 1B conservation components would have no long-term adverse effects on the habitats associated with the vernal pool complex natural community. Initial development and construction of CM4 would result in permanent removal of 1 acre of this community (see Table 12-1B-8). Full implementation of Alternative 1B would also include the following conservation actions over the term of the BDCP to benefit the vernal pool complex natural community.

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

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

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	4	4	0	0	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>205</b>	<b>376</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

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

3 Construction, land grading and habitat restoration activities that would accompany the  
4 implementation of CM1 and CM4 would permanently eliminate an estimated 376 acres of vernal  
5 pool complex natural community in the study area. This modification represents approximately 3%  
6 of the 12,133 acres of the community that is mapped in the study area. These acreages are based on  
7 the proposed location of the CM1 construction footprint and a theoretical footprint for CM4 tidal  
8 marsh restoration activities. An estimated 205 acres of this loss would occur during the first 10  
9 years of Alternative 1B implementation, as water conveyance facilities are constructed and tidal  
10 marsh restoration is initiated. Vernal pool complex protection (400 acres) and restoration (an  
11 estimated 40 acres, with actual restoration based on level of effect) would be initiated during the  
12 first 10 years of Alternative 1B implementation to counteract the loss of habitat. By the end of the  
13 Plan period, 600 acres of this natural community would be protected and up to 67 acres would be  
14 restored. Because of the high sensitivity of this natural community and its shrinking presence in the  
15 Plan Area, avoidance and minimization measures have been built into the BDCP to eliminate the  
16 majority of this potential loss. The BDCP beneficial effect analysis (BDCP Chapter 5, Section 5.4.8.2)  
17 indicates that implementation of Alternative 4 would protect at least 600 acres of vernal pool  
18 complex in Conservation Zones 1, 8, and 11 and additional vernal pool complex would be restored to  
19 achieve no net loss of this community. These conservation activities would also be implemented  
20 under Alternative 1B.

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

- 24 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance  
25 facilities would permanently remove 4 acres of vernal pool complex natural community. The  
26 loss would occur from construction of Alternative 1B's expanded forebay, immediately adjacent  
27 to Clifton Court Forebay at its southwest corner (see Figure 12-1 and Terrestrial Biology  
28 Mapbook). The habitat here is isolated hydrologically from other vernal pool complex by the  
29 existing forebay, the California Aqueduct and agricultural operations. The habitat is of low value  
30 and is made up of degraded vernal pool complex with ruderal herbaceous grasses and forbs, and  
31 patches of iodine bush.

32 Because of the close proximity of construction activity to adjacent vernal pool complex, both  
33 near Clifton Court Forebay and Stone Lakes National Wildlife Refuge, there is also the potential  
34 for indirect loss or damage to vernal pools from changes in pool hydrology or deposition of  
35 construction-related sediment. These potential indirect effects are discussed in detail in the  
36 vernal pool crustaceans impact analysis later in this chapter.

37 The construction activity associated with CM1 also has the potential to lead to increased  
38 nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court Forebay and  
39 Stone Lakes National Wildlife Refuge. A significant number of cars, trucks, and land grading  
40 equipment involved in construction would emit small amounts of atmospheric nitrogen from  
41 fuel combustion; this material could be deposited in sensitive vernal pool areas that are located  
42 west of the major construction areas at Clifton Court Forebay and east of the construction areas  
43 adjacent to Stone Lakes NWR. Nitrogen deposition can pose a risk of adding a fertilizer to  
44 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged  
45 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*

1 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been  
2 concluded that this potential deposition would pose a low risk of changing the vernal pool  
3 complex in the construction areas because the construction would contribute a negligible  
4 amount of nitrogen to regional projected emissions. Also, the construction at Clifton Court  
5 Forebay would occur primarily downwind of the natural community. At Stone Lakes National  
6 Wildlife Refuge, the USFWS refuge management undertakes active invasive species control,  
7 including use of grazing. No adverse effect is expected.

- 8 ● *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 600 acres  
9 of vernal pool complex in CZ 1, CZ 8, and CZ 11 (BDCP Objective VPNC1.1). The protection would  
10 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented  
11 natural landscapes supporting a diversity of native plant and wildlife species. These areas would  
12 be both protected and enhanced to increase the cover of vernal pool complex plants relative to  
13 nonnative species.
- 14 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
15 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and  
16 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal  
17 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres  
18 could be affected. The principal areas likely to be affected include the Cache Slough drainage just  
19 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.
- 20 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal  
21 pool complex and alkali seasonal wetland complex restoration goals. The current estimate for  
22 vernal pool and alkali seasonal wetland complex restoration is 40 acres in the near-term and up  
23 to 67 acres by the end of the BDCP's restoration period. This restoration conservation measure  
24 includes the "no net loss" policy normally applied to this natural community (BDCP Objective  
25 VPNC1.2).

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

### 29 ***Near-Term Timeframe***

30 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
31 affect 205 acres of vernal pool complex natural community through inundation or construction-  
32 related losses in habitat from CM1 and CM4 activities. This loss would likely occur in the Cache  
33 Slough or Suisun Marsh ROAs mapped in Figure 12-1, and in the vicinity of Clifton Court Forebay  
34 (see the Terrestrial Biology Mapbook).

35 The construction or inundation loss of this special-status natural community would represent an  
36 adverse effect if it were not offset by avoidance and minimization measures and restoration actions  
37 associated with BDCP conservation components. Loss of vernal pool complex natural community  
38 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
39 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of  
40 CM3 and the restoration of up to 40 acres of this community (including a commitment to keep pace  
41 with actual losses) as part of CM9 during the first 10 years of Alternative 1B implementation would  
42 partially offset this near-term loss. The Plan focuses this protection in the core vernal pool areas  
43 identified in the USFWS vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core  
44 areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). Typical project-level mitigation ratios (2:1 for

1 protection and 1:1 for restoration) would indicate 410 acres of protection and 205 acres of  
2 restoration would be needed to offset (i.e., mitigate) the 205 acres of loss. Without additional  
3 avoidance and minimization measures to reduce the potential effect, the proposed protection and  
4 restoration would not meet the typical mitigation for vernal pool complex losses.

5 To avoid this adverse effect, the Plan also includes commitments to implement *AMM1 Worker*  
6 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*  
7 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*  
8 *of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM30*  
9 *Transmission Line Design and Alignment Guidelines*. All of these AMMs include elements that avoid or  
10 minimize the risk of affecting habitats at work areas. AMM12 limits the direct removal of vernal pool  
11 crustacean habitat to no more than 10 wetted acres and the indirect effect to no more than 20  
12 wetted acres through the life of the Plan. This is equivalent to approximately 67 acres of direct loss  
13 and 134 acres of indirect loss of vernal pool complex natural community. The AMMs are described in  
14 detail in BDCP Appendix 3.C. With these AMMs in place, and the commitment to have restoration  
15 keep pace with actual vernal pool complex loss, Alternative 1B would not adversely affect vernal  
16 pool complex natural community in the near-term.

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

18 The late long-term effect on vernal pool complex natural community would be 376 acres of  
19 permanent loss. These losses would be associated with the construction of CM1 facilities in the  
20 vicinity of Clifton Court Forebay and the ongoing restoration of tidal wetland in the Cache Slough  
21 and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up to 67 acres would be  
22 restored (CM9) through the course of the Alternative 1B implementation. In addition, the avoidance  
23 and minimization measures listed above would reduce the actual loss of this community to no more  
24 than 10 wetted acres of vernal pool crustacean habitat from direct activities and 20 acres of habitat  
25 from indirect effects.

26 **NEPA Effects:** The conservation measures associated with Alternative 1B include protection of 400  
27 acres (BDCP Objective VPNC 1.1 and CM3) and restoration of an estimated 40 acres (BDCP Objective  
28 VPNC1.2 and CM9) of vernal pool complex in the near-term time frame. The Plan focuses the  
29 protection in the core vernal pool areas identified in the USFWS vernal pool recovery plan (U.S. Fish  
30 and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). In  
31 addition, Alternative 1B includes AMM12 which limits the removal of vernal pool crustacean habitat  
32 to no more than 10 wetted acres and the indirect effect to no more than 20 wetted acres through the  
33 life of the Plan. This is equivalent to approximately 67 acres of direct loss and 134 acres of indirect  
34 loss of vernal pool complex natural community. With this and other AMMs in place, Alternative 1B  
35 would not adversely affect vernal pool complex natural community in the near-term. With these  
36 conservation measures and AMMs in effect through the entire Plan period, Alternative 1B would not  
37 have an adverse effect on the vernal pool complex natural community in the long term.

#### 38 **CEQA Conclusion:**

##### 39 **Near-Term Timeframe**

40 During the 10-year near-term time frame, Alternative 1B could result in the direct loss of  
41 approximately 205 acres of vernal pool complex natural community due to construction of water  
42 conveyance facilities (CM1) and inundation during tidal marsh restoration (CM4). The losses would



1 occur adjacent to Clifton Court Forebay and in the Cache Slough or Suisun Marsh ROAs. The loss  
2 would occur in the 10-year near-term timeframe.

3 The construction- and inundation-related loss of this special-status natural community would  
4 represent a significant impact if it were not offset by avoidance and minimization measures and  
5 other actions associated with BDCP conservation components. Loss of vernal pool complex natural  
6 community would be considered both a loss in acreage of a sensitive natural community and a loss  
7 of wetland as defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex  
8 as part of CM3 and the restoration of an estimated 40 acres of this community (with a commitment  
9 to have restoration keep pace with actual losses) as part of CM9 during the first 10 years of  
10 Alternative 1B implementation would partially offset this near-term loss. Typical project-level  
11 mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 410 acres of protection  
12 and 205 acres of restoration would be needed to offset (i.e., mitigate) the 205 acre of loss. Without  
13 additional avoidance and minimization measures to reduce the potential impact, the proposed  
14 protection and restoration would not meet the typical mitigation for vernal pool complex losses.  
15 However, Alternative 1B also includes AMM1, AMM2, AMM3, AMM4, AMM10, AMM12 and AMM30  
16 to minimize impacts. AMM12 places a strict limit on the acres of wetted vernal pool crustacean  
17 habitat that can be lost to conservation actions (10 acres of direct and 20 acres of indirect loss;  
18 equivalent to approximately 67 acres of direct and 134 acres of indirect loss of vernal pool complex  
19 natural community). Because of the offsetting protection and restoration activities and  
20 implementation of AMMs, impacts would be less than significant.

#### 21 ***Late Long-Term Timeframe***

22 At the end of the Plan period, 376 acres of vernal pool complex natural community could be  
23 permanently removed. Through CMs 3 and 9, 600 acres of vernal pool complex natural community  
24 would be protected and up to 67 acres would be restored. In addition, AMM12 would limit the acres  
25 of wetted vernal pool crustacean habitat loss to 10 acres from direct actions and 20 acres from  
26 indirect actions. There would be no net permanent reduction in the acreage of this natural  
27 community within the study area. Alternative 1B would have a less-than-significant impact on this  
28 natural community.

#### 29 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 30 **Vernal Pool Complex Natural Community**

31 CM2 would modify the inundation/flooding regime of the Yolo Bypass, a man-made waterway. CM2,  
32 which is designed to improve fish passage and shallow flooded habitat for Delta fishes in the Yolo  
33 Bypass, could increase periodic inundation of a small acreage of vernal pool complex natural  
34 community in the southern section of the bypass, south of Putah Creek.

35 Operation of the Yolo Bypass under Alternative 1B would result in an increase in the frequency,  
36 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural  
37 community. The methods used to estimate this inundation acreage are described in BDCP Appendix  
38 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by  
39 inundation would vary with the flow volume that would pass through the newly-constructed notch  
40 in the Fremont Weir. The 4-acre increase in inundation would only occur at the highest modeled  
41 flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in  
42 30% of the years. The vernal pool complex natural community that would likely be affected occurs  
43 in the southern reaches of the bypass, south of Putah Creek. There are several relatively large,  
44 contiguous areas of vernal pools on the western edge of the bypass in this area. The anticipated

1 change in management of flows in the Yolo Bypass includes more frequent releases in flows into the  
2 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in  
3 spring months (April and May).

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

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

### 15 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing** 16 **Operation, Maintenance and Management Activities**

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

- 28 ● *Modified river flows upstream of and within the study area and reduced diversions from south*  
29 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
30 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
31 channels (associated with Operational Scenario A) would not affect vernal pool complex natural  
32 community. This natural community does not exist within or adjacent to the active Sacramento  
33 River system channels and Delta waterways.
- 34 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
35 conveyance facilities and levees associated with the BDCP actions have the potential to require  
36 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool  
37 complex habitats. This activity could lead to increased soil erosion and runoff entering these  
38 habitats. These activities would be subject to normal erosion and runoff control management  
39 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
40 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or  
41 earthwork adjacent to vernal pool complex habitats would require use of sediment barriers, soil  
42 stabilization and revegetation of disturbed surfaces (*AMM10 Restoration of Temporarily Affected*  
43 *Natural Communities*). Proper implementation of these measures would avoid permanent  
44 adverse effects on this community.

- 1       ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
2       treatment, would be a periodic activity associated with the long-term maintenance of water  
3       conveyance facilities and restoration sites(*CM11 Natural Communities Enhancement and*  
4       *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
5       vernal pool complex natural community at or adjacent to treated areas. The hazard could be  
6       created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
7       onto the natural community, or direct discharge of herbicides to vernal pool complex areas  
8       being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
9       *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce  
10      hazards to humans and the environment from use of various chemicals during maintenance  
11      activities, including the use of herbicides. These commitments are described in Appendix 3B,  
12      including the commitment to prepare and implement spill prevention, containment, and  
13      countermeasure plans and stormwater pollution prevention plans. Best management practices,  
14      including control of drift and runoff from treated areas, and use of herbicides approved for use  
15      in terrestrial or aquatic environments would also reduce the risk of affecting natural  
16      communities adjacent to water conveyance features and levees associated with restoration  
17      activities.
- 18      ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
19      communities within the Plan Area (CM11). For the vernal pool complex natural community, a  
20      management plan would be prepared that specifies actions to improve the value of the habitats  
21      for covered species. Actions would include control of invasive nonnative plant and animal  
22      species, fire management, restrictions on vector control and application of herbicides, and  
23      maintenance of infrastructure that would allow for movement through the community. The  
24      enhancement efforts would improve the long-term value of this community for both special-  
25      status and common species.
- 26      ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool  
27      complexes in the reserve system. The activities could include wildlife and plant viewing and  
28      hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
29      3.4.11) describes this program and identifies applicable restrictions on recreation that might  
30      adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure  
31      (AMM37) that further dictates limits on recreation activities that might affect vernal pools.  
32      Recreational trails would be limited to existing trails and roads. New trail construction would be  
33      prohibited within the vernal pool complex reserves. It is expected that most activities would be  
34      docent-led tours of reserves, minimizing adverse effects.

35      The various operations and maintenance activities described above could alter acreage of vernal  
36      pool complex natural community in the study area. Activities could introduce sediment and  
37      herbicides that would reduce the value of this community to common and sensitive plant and  
38      wildlife species. Other periodic activities associated with the Plan, including management,  
39      protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
40      *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
41      enhance the value of the community. While some of these activities could result in small changes in  
42      acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*  
43      *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of  
44      AMM2, AMM4, AMM5, AMM10, AMM12, AMM30 and AMM37. The management actions associated  
45      with control of invasive plant species would also result in a long-term benefit to the species  
46      associated with vernal pool complex habitats by eliminating competitive, invasive species of plants.

1 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
2 Alternative 1B would not result in a net permanent reduction in the vernal pool complex natural  
3 community within the study area. Therefore, there would be no adverse effect on this natural  
4 community.

5 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would  
6 have the potential to create minor changes in total acreage of vernal pool complex natural  
7 community in the study area, and could create temporary increases in sedimentation or damage  
8 from recreational activity. The activities could also introduce herbicides periodically to control  
9 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,  
10 AMM5, AMM10, AMM12, AMM30 and AMM37 would minimize these impacts, and other operations  
11 and maintenance activities, including management, protection and enhancement actions associated  
12 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
13 *Enhancement and Management*, would create positive effects, including reduced competition from  
14 invasive, nonnative plants in these habitats. Long-term restoration activities associated with *CM9*  
15 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with  
16 *CM3 Natural Communities Protection and Restoration* would ensure that the acreage of this natural  
17 community would not decrease in the study area. Ongoing operation, maintenance and management  
18 activities would not result in a net permanent reduction in this natural community within the study  
19 area. Therefore, there would be a less-than-significant impact.

## 20 **Managed Wetland**

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

- 26 ● Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the  
27 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- 28 ● Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in  
29 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in  
30 Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood  
31 events (Objective GSHC1.3, associated with CM10).
- 32 ● Create two wetland complexes within the SLNWR refuge boundary. Each complex will consist of  
33 at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One of the  
34 wetland complexes may be replaced by 180 acres of cultivated lands that are flooded following  
35 harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with CM10).

36 In addition to this conservation action, creation of similar habitat values by restoring tidal brackish  
37 emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the  
38 losses of managed wetland. The net effect would be a substantial decrease in the amount of  
39 managed wetlands, but an increase in similar habitat value for special-status and common species as  
40 the managed wetland is converted to tidal marsh. Impacts on this natural community would not be  
41 adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to Impacts  
42 BIO-178 through BIO-183 in the *Shorebirds and Waterfowl* discussion at the end of this section  
43 (Section 12.3.3.3) for further consideration of the effects of removing managed wetland natural  
44 community.

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	6	6	18	18	0	0
CM2	24	24	44	44	931-2,612	0
CM4	5,718	13,746	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>5,748</b>	<b>13,776</b>	<b>60</b>	<b>60</b>	<b>931-2,612</b>	<b>6</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

2

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

5 Construction, land grading and habitat restoration activities that would accompany the  
6 implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 13,776  
7 acres of managed wetland in the study area. This modification represents approximately 19% of the  
8 70,798 acres of managed wetland that is mapped in the study area. This loss would occur through  
9 the course of the BDCP restoration program, as construction activity and tidal marsh restoration  
10 proceeds. Managed wetland protection (8,100 acres) and restoration (500 acres) would take place  
11 over the same period, but would not replace the acreage lost. The BDCP beneficial effects analysis  
12 for Alternative 4 (BDCP Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of managed  
13 wetlands would be protected, of which at least 1,500 acres would be located within the Grizzly  
14 Island marsh complex, consistent with the U.S. Fish and Wildlife Service salt marsh harvest mouse  
15 recovery plan. Although the primary purpose of the 1,500 acres of protection is to protect and  
16 enhance habitat for the salt marsh harvest mouse, it is also expected to benefit the managed wetland  
17 natural community and the diversity of species that use it, including migratory waterfowl and the  
18 western pond turtle. These same conservation actions would be implemented for Alternative 1B.

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

- 22 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance  
23 facilities would permanently remove 6 acres and temporarily remove 18 acres of managed  
24 wetland community. The permanent losses would occur where the new canal would overlay

1 small bands of managed wetland in the vicinity of Lambert Road, at a bridge crossing of the  
2 canal at Guard Road just west of Stockton, and on the canal corridor just south of its crossing of  
3 the San Joaquin River. The temporary losses would also occur where small patches or stringers  
4 of managed wetland would be removed for siphon construction at Beaver Slough, Hog Slough,  
5 White Slough, and Railroad Cut. A small area would be temporarily affected by transmission line  
6 construction adjacent to Old River near its junction with Victoria Canal.(see Terrestrial Biology  
7 Mapbook). These losses would take place during the near-term construction period.

- 8 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
9 construction activities that could permanently or temporarily remove managed wetland,  
10 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir  
11 modification and Sacramento Weir improvements. All of these activities could involve  
12 excavation and grading in managed wetland areas to improve passage of fish through the  
13 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
14 permanently removed and 44 acres could be temporarily removed. This activity would occur  
15 primarily in the near-term timeframe.
- 16 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
17 footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of  
18 managed wetland community. These losses would be expected to occur primarily in the Suisun  
19 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).  
20 These acres of managed wetland would be converted to natural wetland, including large  
21 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These  
22 natural wetlands provide comparable or improved habitat for the special-status species that  
23 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in  
24 fragmentation of managed wetland, as most species are capable of utilizing both communities.  
25 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be  
26 enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as  
27 established by BDCP Objective MWNC1.1. All of the restoration and 4,800 acres of the protection  
28 would occur during the first 10 years of Alternative 1B implementation, which would coincide  
29 with the timeframe of water conveyance facilities construction and early implementation of  
30 CM4. The remaining restoration would be spread over the following 30 years. Managed wetland  
31 restoration is expected to include at least 320 acres in CZ 3, CZ 4, CZ 5, and CZ 6 (Figure 12-1) to  
32 benefit sandhill crane, as stated in BDCP Objective GSHC1.3. The enhancement and protection  
33 would be focused in Suisun Marsh, but could also occur in CZs with existing managed wetland  
34 (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and CZ 7).
- 35 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
36 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of  
37 this loss cannot be quantified at this time, but the majority of the enhancement activity would  
38 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
39 Managed wetland adjacent to these tidal areas could be affected. The improvements would  
40 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,  
41 and along Steamboat and Sutter Sloughs.

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

1 **Near-Term Timeframe**

2 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
 3 permanently remove 5,748 acres and temporarily remove 60 acres of managed wetland through  
 4 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Six acres of  
 5 the permanent loss and 18 acres of the temporary loss would be associated with construction of the  
 6 water conveyance facilities (CM1). These near-term losses would occur in various locations, but the  
 7 majority of the near-term loss would occur in Suisun Marsh and the lower Yolo Bypass as tidal  
 8 marsh is restored.

9 The construction or inundation loss of this special-status natural community would represent an  
 10 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural  
 11 community would be considered both a loss in acreage of a sensitive natural community and  
 12 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are  
 13 interspersed with small natural wetlands that would be regulated under Section 404. The  
 14 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres (CM3) of managed  
 15 wetland during the first 10 years of Alternative 1B implementation would fully offset the losses  
 16 associated with CM1, but would only partially offset the total near-term loss. Typical project-level  
 17 mitigation ratios (1:1 for protection) would indicate 24 acres of protection would be needed to  
 18 offset the 24 acres of loss associated with CM1; a total of 5,808 acres of protection would be needed  
 19 to offset (i.e., mitigate) the 5,808 acres of permanent and temporary loss from all near-term actions.  
 20 The combined protection and restoration proposed for managed wetland in the near-term would  
 21 fall 508 acres short of full replacement. However, the CM4 marsh restoration activities that would be  
 22 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland  
 23 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-  
 24 term. This acreage would significantly exceed the number of acres of managed wetland lost.  
 25 Mitigation measures would also be implemented to reduce the effects of managed wetland loss on  
 26 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo and Delta basins (Mitigation  
 27 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to  
 28 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*  
 29 *Biology Effects* discussion later in this section (Section 12.3.3.3).

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

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

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 13,776 acres of managed wetland natural community would be  
3 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would  
4 be restored. There would be a net permanent reduction in the acreage of this special-status natural  
5 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal  
6 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this  
7 managed wetland.

8 **NEPA Effects:** Alternative 1B would result in a loss 13,776 acres of managed wetland within the  
9 study area; however, it would also protect and enhance 8,100 acres and restore 500 acres of this  
10 habitat. In addition, Alternative 1B would restore 6,000 acres of tidal brackish emergent wetland  
11 and 24,000 acres of tidal freshwater emergent wetland that support similar ecological functions to  
12 those of managed wetland. Therefore, there would be no adverse effect on managed wetland natural  
13 community.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
17 permanently remove 5,748 acres and temporarily remove 60 acres of managed wetland through  
18 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Six acres of  
19 the permanent loss and 18 acres of the temporary loss would be associated with construction of the  
20 water conveyance facilities (CM1). These losses would occur in various locations, but the majority of  
21 the near-term loss would occur in Suisun Marsh and the lower Yolo Bypass as tidal marsh is  
22 restored.

23 The construction or inundation loss of this special-status natural community would represent a  
24 significant impact if it were not offset by other conservation actions. Loss of managed wetland  
25 natural community would be considered both a loss in acreage of a sensitive natural community and  
26 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and  
27 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during  
28 the first 10 years of Alternative 1B implementation would fully offset the losses associated with  
29 CM1, but would only partially offset the total near-term loss. Typical project-level mitigation ratios  
30 (1:1 for protection) would indicate 24 acres of protection would be needed to offset the 24 acres of  
31 loss associated with CM1; a total of 5,808 acres of protection would be needed to offset (i.e.,  
32 mitigate) the 5,808 acres of permanent and temporary loss from all near-term actions. The  
33 combined protection and restoration proposed for managed wetland in the near-term would fall  
34 508 acres short of full replacement. However, the CM4 marsh restoration activities that would be  
35 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland  
36 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-  
37 term. This acreage would significantly exceed the number of acres of managed wetland lost.  
38 Mitigation measures would also be implemented to reduce the effects of managed wetland loss on  
39 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo and Delta basins (Mitigation  
40 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to  
41 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*  
42 *Biology Effects* discussion later in this section.



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

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

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

18 At the end of the Plan period, 13,776 acres of managed wetland natural community would be  
19 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would  
20 be restored. There would be a net permanent reduction in the acreage of this special-status natural  
21 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal  
22 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this  
23 managed wetland. Because these natural wetlands support similar ecological functions to those of  
24 managed wetland, there would be a less-than-significant impact.

### 25 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 26 **Managed Wetland Natural Community**

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

- 34 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B  
35 would result in an increase in the frequency, magnitude and duration of inundation of 931-2,612  
36 acres of managed wetland natural community. The methods used to estimate these inundation  
37 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*  
38 *Plants*. The area more frequently affected by inundation would vary with the flow volume that  
39 would pass through the newly-constructed notch in the Fremont Weir. The 931-acre increase in  
40 inundation would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the  
41 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
42 through Fremont Weir would be expected in 30% of the years. Based on the theoretical  
43 modeling that has been completed to-date, the largest acreages would be associated with the  
44 Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands

1 south of Putah Creek. The anticipated change in management of flows in the Yolo Bypass  
2 includes more frequent releases in flows into the bypass from the Fremont and Sacramento  
3 Weirs, and in some years, later releases into the bypass in spring months (April and May). With  
4 larger flows, the water depths may also increase over Existing Conditions. While the managed  
5 wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more frequent  
6 and extended inundation periods may make it more difficult to actively manage the areas for  
7 maximum food production for certain species (waterfowl primarily) and may alter the plant  
8 assemblages in some years. The effects of this periodic inundation on birds and other terrestrial  
9 species are discussed later in this chapter. The additional inundation would not be expected to  
10 reduce the acreage of managed wetland on a permanent basis. The extended inundation would  
11 be designed to expand foraging and spawning habitat for Delta fishes.

- 12 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
13 increase in the frequency, magnitude and duration of inundation of an estimated 6 acres of  
14 managed wetland. Specific locations for this restoration activity have not been identified, but  
15 they would likely be focused in the south Delta area, along the major rivers and Delta channels.  
16 The connection of these wetlands to stream flooding events would be beneficial to the ecological  
17 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging  
18 activity and refuge sites would be expanded into areas currently unavailable or infrequently  
19 available to some aquatic species. The more frequent flooding would periodically interfere with  
20 management activities associated with terrestrial species (primarily waterfowl) and may result  
21 in changes in plant composition and management strategies over time.

22 In summary, 937–2,618 acres of managed wetland community in the study area would be subjected  
23 to more frequent inundation as a result of implementing two Alternative 1B conservation measures  
24 (CM2 and CM5).

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

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

### 38 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing** 39 **Operation, Maintenance and Management Activities**

40 Once the physical facilities associated with BDCP Alternative 1B are constructed and the stream flow  
41 regime associated with changed water management is in effect, there would be new ongoing and  
42 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
43 conservation lands that could affect managed wetland natural community in the study area. The  
44 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced

1 diversions from south Delta channels, and recreational use of reserve areas. These actions are  
2 associated with CM1 and CM11 (see the above impact discussion for effects associated with CM2).  
3 The periodic actions would involve access road and conveyance facility repair, vegetation  
4 management at the various water conveyance facilities and habitat restoration sites (CM11), levee  
5 and canal repair and replacement of levee armoring, channel dredging, and habitat enhancement in  
6 accordance with natural community management plans. The potential effects of these actions are  
7 described below.

- 8 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
9 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
10 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
11 channels (associated with Operational Scenario A) would not result in the reduction in acreage  
12 of the managed wetland natural community in the study area. Flow levels in the upstream rivers  
13 would not change to the degree that water levels in adjacent managed wetlands would be  
14 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not  
15 result in a permanent reduction in the managed wetland community downstream of these  
16 diversions. The majority of the managed wetlands below the diversions is not directly connected  
17 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in  
18 this natural community.
- 19 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
20 conveyance facilities and levees associated with the BDCP actions have the potential to require  
21 removal of adjacent vegetation and could entail earth and rock work in managed wetland  
22 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
23 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff  
24 control management practices, including those developed as part of *AMM2 Construction Best*  
25 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
26 vegetation removal or earthwork adjacent to or within managed wetland habitats would require  
27 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.  
28 Proper implementation of these measures would avoid permanent adverse effects on this  
29 community.
- 30 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
31 treatment, would be a periodic activity associated with the long-term maintenance of water  
32 conveyance facilities and the levees associated with restoration sites (*CM11 Natural Communities*  
33 *Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a  
34 long-term hazard to managed wetland natural community at or adjacent to treated areas. The  
35 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
36 stormwater onto the community, or direct discharge of herbicides to managed wetland areas  
37 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
38 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce  
39 hazards to humans and the environment from use of various chemicals during maintenance  
40 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
41 including the commitment to prepare and implement spill prevention, containment, and  
42 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
43 including control of drift and runoff from treated areas, and use of herbicides approved for use  
44 in aquatic and terrestrial environments would also reduce the risk of affecting natural  
45 communities adjacent to water conveyance features and levees associated with restoration  
46 activities.

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

- 11 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
12 communities within the Plan Area (CM11). For the managed wetland natural community, a  
13 management plan would be prepared that specifies actions to improve the value of the habitats  
14 for covered species. Actions would include control of invasive nonnative plant and animal  
15 species, fire management, restrictions on vector control and application of herbicides, and  
16 maintenance of infrastructure that would allow for movement through the community. The  
17 enhancement efforts would improve the long-term value of this community for both special-  
18 status and common species.
- 19 ● *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve  
20 areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
21 3.4.11) describes this program and identifies applicable restrictions on recreation that might  
22 adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization  
23 measure (AMM37) that further dictates limits on recreation activities that might affect this  
24 natural community. Hunting would be the dominant activity in fall and winter months, while  
25 fishing and hiking would be allowed in non-hunting months.

26 The various operations and maintenance activities described above could alter acreage of managed  
27 wetland natural community in the study area through facilities maintenance, vegetation  
28 management and recreation. Activities could also introduce sediment and herbicides that would  
29 reduce the value of this community to common and sensitive plant and wildlife species. Other  
30 periodic activities associated with the Plan, including management, protection and enhancement  
31 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural  
32 Communities Enhancement and Management*, would be undertaken to enhance the value of the  
33 community. While some of these activities could result in small changes in acreage, these changes  
34 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration*, *CM4  
35 Tidal Natural Communities Restoration*, and protection and restoration actions associated with *CM3  
36 Natural Communities Protection and Restoration*. Recreation activity effects would be minimized by  
37 AMM37 (BDCP Appendix 3.C). The management actions associated with levee repair and control of  
38 invasive plant species would also result in a long-term benefit to the species associated with  
39 managed wetland habitats by improving water movement.

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

44 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would  
45 have the potential to create minor changes in total acreage of managed wetland natural community

1 in the study area, and could create temporary increases in turbidity and sedimentation. The  
2 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting  
3 could intermittently reduce the availability of this community to special-status and common wildlife  
4 species. Implementation of environmental commitments and AMM2, AMM4, AMM5 and AMM37  
5 would minimize these impacts, and other operations and maintenance activities, including  
6 management, protection and enhancement actions associated with *CM3 Natural Communities*  
7 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
8 create positive effects, including improved water movement in and adjacent to these habitats. Long-  
9 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*  
10 *Communities Restoration* and protection and restoration actions associated with *CM3 Natural*  
11 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural  
12 community in the study area. Ongoing operation, maintenance and management activities would not  
13 result in a net permanent reduction in this sensitive natural community within the study area.  
14 Therefore, there would be a less-than-significant impact.

### 15 **Other Natural Seasonal Wetland**

16 The other natural seasonal wetlands natural community encompasses all the remaining natural (not  
17 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.  
18 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area  
19 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils  
20 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area  
21 are located along the Cosumnes River northeast of Thornton, and in the western extension of the  
22 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh  
23 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are  
24 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure 12-  
25 1). The only Alternative 1B conservation component that would potentially affect this natural  
26 community is the seasonally inundated floodplain restoration conservation measure (CM5) (see  
27 Table 12-1B-10).

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

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

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

3

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

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

17 **NEPA Effects:** Alternative 1B conservation actions would not adversely affect other natural seasonal  
18 wetland natural community because the small increase in periodic flooding of up to 2 acres would  
19 not alter its function or general species makeup.

20 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study  
21 area would be subjected to more frequent inundation from flood flows as a result of implementing  
22 CM5 under Alternative 1B. This community would not be significantly impacted because a small  
23 increase in periodic flooding would not alter its ecological function or species composition. The  
24 periodic inundation would not result in a net permanent reduction in the acreage of this community

1 in the study area. Therefore, there would be no substantial adverse effect on the community. The  
2 impact would be less than significant.

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

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

- 15 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
16 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
17 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
18 channels (associated with Operational Scenario A) would not affect other natural seasonal  
19 wetland natural community. The small areas mapped in the study area are not in or adjacent to  
20 streams that would experience changes in water levels as a result of these operations.
- 21 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
22 conveyance facilities and levees associated with the BDCP actions have the potential to require  
23 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal  
24 wetland habitats. This activity could lead to increased soil erosion and runoff entering these  
25 habitats. These activities would be subject to normal erosion and runoff control management  
26 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
27 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or  
28 earthwork adjacent to or within other natural seasonal wetland habitats would require use of  
29 sediment barriers, soil stabilization and revegetation of disturbed surfaces as required by  
30 *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of  
31 these measures would avoid permanent adverse effects on this community.
- 32 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
33 treatment, would be a periodic activity associated with the long-term maintenance of water  
34 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
35 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
36 the other natural seasonal wetland natural community at or adjacent to treated areas. The  
37 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
38 stormwater onto the natural community, or direct discharge of herbicides to wetland areas  
39 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
40 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce  
41 hazards to humans and the environment from use of various chemicals during maintenance  
42 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
43 including the commitment to prepare and implement spill prevention, containment, and  
44 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
45 including control of drift and runoff from treated areas, and use of herbicides approved for use

1 in terrestrial or aquatic environments would also reduce the risk of affecting natural  
2 communities adjacent to water conveyance features and levees associated with restoration  
3 activities.

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

12 The various operations and maintenance activities described above could alter acreage of other  
13 natural seasonal wetland natural community in the study area. Activities could introduce sediment  
14 and herbicides that would reduce the value of this community to common and sensitive plant and  
15 wildlife species. Other periodic activities associated with the Plan, including management,  
16 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
17 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
18 enhance the value of the community. While some of these activities could result in small changes in  
19 acreage, these changes would be minor when compared with the restoration activities planned as  
20 part of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by  
21 implementation of AMM2, AMM4, AMM5, and AMM10. The vernal pool complex conservation  
22 measure includes restoration of 139 acres of seasonal wetlands with similar ecological values as the  
23 other natural seasonal wetland community. The management actions associated with control of  
24 invasive plant species would also result in a long-term benefit to the species associated with other  
25 natural seasonal wetland habitats by eliminating competitive, invasive species of plants.

26 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
27 Alternative 1B would not result in a net permanent reduction in the other natural seasonal wetland  
28 natural community within the study area. Therefore, there would be no adverse effect on this  
29 natural community.

30 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would  
31 have the potential to create minor changes in total acreage of other natural seasonal wetland natural  
32 community in the study area, and could create temporary increases sedimentation. The activities  
33 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of  
34 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,  
35 and other operations and maintenance activities, including management, protection and  
36 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
37 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
38 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration  
39 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and  
40 protection actions associated with *CM3 Natural Communities Protection and Restoration* would  
41 ensure that the ecological values provided by this small natural community would not decrease in  
42 the study area. Ongoing operation, maintenance and management activities would not result in a net  
43 permanent reduction in this natural community within the study area. Therefore, there would be a  
44 less-than-significant impact.



1 **Grassland**

2 Construction, operation, maintenance and management associated with the conservation  
3 components of Alternative 1B would have no long-term adverse effects on the habitats associated  
4 with the grassland natural community. Initial development and construction of CM1, CM2, CM4,  
5 CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this  
6 community(see Table 12-1B-11). Full implementation of Alternative 1B would also include the  
7 following conservation actions over the term of the BDCP to benefit the grassland natural  
8 community.

- 9 ● Protect 8,000 acres of grassland with at least 2,000 acres protected in Conservation Zone 1, at  
10 least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected in  
11 Conservation Zone 11 (Objective GNC1.1, associated with CM3).
- 12 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland and to  
13 provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for wildlife  
14 foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8).
- 15 ● Of the 8,000 acres of grassland protected and at least 2,000 acres of grassland restored, protect  
16 or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide 200 feet  
17 of adjacent grasslands beyond the sea level rise accommodation (Objective GNC1.4, associated  
18 with CM3 and CM8).

19 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
20 3.3 that would improve the value of grassland natural community for terrestrial species. As  
21 explained below, with the protection, restoration and enhancement of the amounts of habitat listed  
22 in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community  
23 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

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

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	400	400	358	358	0	0
CM2	388	388	239	239	385–1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	32	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
	0	0	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>1,288</b>	<b>2,456</b>	<b>597</b>	<b>629</b>	<b>385–1,277</b>	<b>514</b>

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

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

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

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

NT = near-term

LLT = late long-term

Unk. = unknown

2

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

5 Construction, land grading and habitat restoration activities that would accompany the  
6 implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would permanently eliminate  
7 an estimated 2,456 acres and temporarily remove 629 acres of grassland natural community in the  
8 study area. These modifications represent approximately 4% of the 78,047 acres of the community  
9 that is mapped in the study area. Approximately 61% (1,885 acres) of the permanent and temporary  
10 losses would occur during the first 10 years of Alternative 1B implementation, as water conveyance  
11 facilities are constructed and habitat restoration is initiated. Grassland protection (2,000 acres),  
12 restoration (1,140 acres) and enhancement would be initiated during the same period. By the end of  
13 the Plan period, 2,000 acres of this natural community would be restored and 8,000 acres would be  
14 protected. The BDCP beneficial effects analysis for grassland for Alternative 4 (BDCP Chapter 5,  
15 Section 5.4.11.2) indicates that 8,000 acres of grasslands would be protected in Conservation Zones  
16 1, 2, 4, 5, 7, 8, and 11, and 2,000 acres of grassland would be restored. Grassland protection and  
17 restoration would improve connectivity among habitat areas in and adjacent to the Plan Area,  
18 improve genetic interchange among native species' populations, and contribute to the long-term  
19 conservation of grassland-associated covered species. These same conservation actions would be  
20 implemented for Alternative 1B.

- 1       • The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions. *CM1 Water Facilities and Operation*: Construction of the  
4 Alternative 1B water conveyance facilities would permanently remove 400 acres and  
5 temporarily remove 358 acres of grassland natural community. The permanent losses would  
6 occur at various locations along the new canal route and at the intake sites along the Sacramento  
7 River. The principal losses would occur at intakes 1 and 5; and along the canal east and south of  
8 Hood, south of Lambert Road, north of Lost Slough, north of White Slough, and at the San  
9 Joaquin River near its junction with Fourteen Mile Slough. These grassland areas are dominated  
10 by ruderal herbaceous grasses and forbs. Large permanent losses of annual grassland would  
11 also occur at the new forebay site just south of Clifton Court Forebay. The temporary losses  
12 would occur at intake sites and at siphon or tunnel work areas where the canal would cross the  
13 slough that connects Snodgrass Slough with the south end of Stone Lakes, Lost Slough, Beaver  
14 Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, San Joaquin River,  
15 Railroad Cut, Middle River near its junction with Victoria Canal, and Old River just south of  
16 Clifton Court Forebay (see the Terrestrial Biology Mapbook for locations). These losses would  
17 take place during the near-term construction period.

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

- 32       • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
33 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
34 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and  
35 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could  
36 involve excavation and grading in grassland areas to improve passage of fish through the  
37 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be  
38 permanently lost and another 239 acres could be temporarily removed. Most of the grassland  
39 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of  
40 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These  
41 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland  
42 removal along the side channels of the bypass could pose barriers to grassland species moving  
43 within the bypass. These losses would occur primarily in the near-term timeframe.
- 44       • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
45 footprints, implementation of CM4 would permanently inundate or remove 448 acres of  
46 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the

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

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

1 programmatic. At the current level of planning, it is assumed that the trail system would be  
2 located entirely in grassland habitats and would include up to 50 acres of habitat loss.

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

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

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

13 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would  
14 affect the grassland natural community through CM1 construction losses (400 acres permanent and  
15 358 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),  
16 CM7 riparian habitat restoration (4 acres permanent), CM11 recreational trail construction (13  
17 acres permanent), and CM18 fish hatchery construction (35 acres permanent). These losses would  
18 occur along the eastern bank of the Sacramento River at intake sites, at various locations along the  
19 east canal corridor, at currently unspecified sites for hatchery and recreational trail construction  
20 and restoration, at the southern forebay, in the northern Yolo Bypass, and along the east and west  
21 channels within the Yolo Bypass. Approximately 448 acres of the inundation and construction-  
22 related losses in habitat from CM4 would occur in the near-term throughout the ROAs mapped in  
23 Figure 12-1.

24 The construction losses of this natural community would not represent an adverse effect based on  
25 the significance criteria used for this chapter because grassland is not considered a special-status or  
26 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual  
27 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of  
28 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*  
29 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in  
30 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and  
31 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of  
32 Alternative 1B implementation, and the commitment to restore temporarily affected grassland (597  
33 acres) to its pre-project condition within one year of completing construction as required by *AMM10*  
34 *Restoration of Temporarily Affected Natural Communities* would not completely offset this near-term  
35 loss and avoid any loss in the availability of this habitat for special-status species. Typical project-  
36 level mitigation ratios (2:1 for protection) would indicate that 3,770 acres of protection would be  
37 needed to offset (i.e., mitigate) the 1,885 acres of loss. The restoration and protection measures  
38 contained in Alternative 1B would fall short of complete mitigation by 33 acres in the near-term.  
39 Because grassland is not considered a special-status natural community, this effect would not be  
40 adverse. The Plan also includes commitments to implement *AMM1 Worker Awareness Training*,  
41 *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
42 *Reusable Tunnel Material, and Dredged Material*, and *AMM7 Barge Operations Plan*. All of these  
43 AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and  
44 storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1B as a whole would result in 4% losses of grassland natural  
3 community in the study area. These losses (2,456 acres of permanent and 629 acres of temporary  
4 loss) would be largely associated with construction of the water conveyance facilities (CM1),  
5 construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh  
6 restoration (CM4). Inundation losses would occur during the course of the Plan's restoration  
7 activities at various tidal restoration sites throughout the study area.

8 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community  
9 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur  
10 primarily in CZ 1, CZ 8 and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay areas.  
11 Temporarily affected grassland would also be restored following construction activity. The 2,000  
12 acres of restoration associated with CM8, and the restoration of temporarily affected grassland  
13 required by AMM10 (629 acres for Alternative 1B) would not totally replace the grassland acres lost  
14 through the Plan timeframe (3,085 acres). There would be a permanent loss of 456 acres of  
15 grassland in the study area. However, the combination of restoration, protection and enhancement  
16 of grassland associated with Alternative 1B would improve the habitat value of this community in  
17 the study area; there would not be an adverse effect on the grassland natural community.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Alternative 1B would result in the loss of approximately 1,885 acres of grassland natural community  
21 due to construction of the water conveyance facilities (CM1), fish passage improvements (CM2),  
22 inundation during tidal marsh restoration (CM4), riparian habitat restoration (CM7), recreational  
23 trail construction (CM11), and fish hatchery construction (CM18). These losses would occur at  
24 Sacramento River intake sites, at various locations along the east canal corridor, at the southern  
25 forebay, in the northern Yolo Bypass, at as yet undetermined recreational trail and fish hatchery  
26 construction sites, at riparian habitat restoration sites, along the east and west channels within the  
27 Yolo Bypass, and at inundation sites at various tidal restoration sites throughout the study area. The  
28 construction losses would be spread across a 10-year near-term timeframe.

29 The construction losses of this natural community would not represent a significant impact based  
30 on the significance criteria used for this chapter because grassland is not considered a special-status  
31 or sensitive natural community. These losses would not be totally offset by planned restoration of  
32 1,140 acres and protection of 2,000 acres of grassland natural community scheduled for the first 10  
33 years of Alternative 1B implementation, and the restoration of temporarily affected grassland (597  
34 acres under Alternative 1B) as dictated by AMM10. Typical project-level mitigation ratios (2:1 for  
35 protection) would indicate that 3,770 acres of protection would be needed to offset (i.e., mitigate)  
36 the 1,885 acres of loss. The restoration and protection would fall 33 acres short in the near-term.  
37 Also, AMM1, AMM2, AMM6, and AMM7 would be implemented to minimize impacts. Because of  
38 these offsetting near-term restoration and protection activities and AMMs, and because grassland is  
39 not a special-status natural community, the impacts would be less-than-significant.

40 **Late Long-Term Timeframe**

41 At the end of the Plan period, 3,085 acres of grassland natural community would be permanently or  
42 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would  
43 be protected. Temporarily affected areas would also be restored (629 acres for Alternative 1B).

1 While there would be a net permanent reduction in the acreage of this natural community within  
2 the study area (total loss of 456 acres), there would be an increase in the value of grassland for  
3 special-status and common species in the study area through the combination of conservation  
4 actions (CM3 and CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7,  
5 and AMM10). Therefore, Alternative 1B would have a less-than-significant impact on this natural  
6 community.

7 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
8 **Grassland Natural Community**

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

- 15 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B  
16 would result in an increase in the frequency, magnitude and duration of inundation of 385–  
17 1,277 acres of grassland natural community. The methods used to estimate this inundation  
18 acreage are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*.  
19 The area more frequently affected by inundation would vary with the flow volume that would  
20 pass through the newly-constructed notch in the Fremont Weir. The 385-acre increase in  
21 inundation would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur  
22 at the 4,000 cfs flow regime. Plan-related increases in flow through Fremont Weir would be  
23 expected in 30% of the years. The grassland community occurs throughout the bypass, including  
24 a large acreage just below Fremont Weir in the north end of the bypass, in stringers along the  
25 internal waterways of the bypass and in larger patches in the lower bypass. The anticipated  
26 change in management of flows in the Yolo Bypass includes more frequent releases in flows into  
27 the bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the  
28 bypass in spring months (April and May). The modification of periodic inundation events would  
29 not adversely affect grassland habitats, as they have persisted under similar high flows and  
30 extended inundation periods. There is the potential for some change in grass species  
31 composition as a result of longer inundation periods. The effects of this inundation on wildlife  
32 and plant species are described in detail in later sections of this chapter.
- 33 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
34 increase in the frequency and duration of inundation of 514 acres of grassland habitats. Specific  
35 locations for this restoration activity have not been identified, but they would likely be focused  
36 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 3-1). The  
37 increase in periodic stream flooding events would not adversely affect the habitat values and  
38 functions of grassland natural community.

39 In summary, 899–1,790 acres of grassland natural community in the study area would be subjected  
40 to more frequent inundation as a result of implementing CM2 and CM5 under Alternative 1B. The  
41 grassland community is conditioned to periodic inundation; therefore, periodic inundation would  
42 not result in a net permanent reduction in the acreage of this community in the study area.

43 **NEPA Effects**: Increasing periodic inundation of grassland natural community in the Yolo Bypass  
44 and along south Delta waterways would not constitute an adverse effect.

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

7 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,**  
8 **Maintenance and Management Activities**

9 Once the physical facilities associated with Alternative 1B are constructed and the stream flow  
10 regime associated with changed water management is in effect, there would be new ongoing and  
11 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
12 conservation lands that could affect grassland natural community in the study area. The ongoing  
13 actions include the diversion of Sacramento River flows in the north Delta, and reduced diversions  
14 from south Delta channels. These actions are associated with CM1 (see Impact BIO-30 for effects  
15 associated with CM2). The periodic actions would involve access road and conveyance facility  
16 repair, vegetation management at the various water conveyance facilities and habitat restoration  
17 sites (CM13), levee repair and replacement of levee armoring, channel dredging, and habitat  
18 enhancement in accordance with natural community management plans. The potential effects of  
19 these actions are described below.

- 20 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
21 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
22 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
23 channels (associated with Operational Scenario A) would not result in the permanent reduction  
24 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers  
25 would not change such that the acreage of this community would be reduced on a permanent  
26 basis. The grassland along rivers upstream of planned north Delta diversions is primarily  
27 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination  
28 and growth rather than on river levels. Similarly, increased diversions of Sacramento River  
29 flows in the north Delta would not result in a permanent reduction in grassland natural  
30 community downstream of these diversions. The reductions in flows below the intakes would  
31 occur primarily in the wet months when the existing nonnative annual grasslands along river  
32 levees are dormant, and like upstream grassland, this community is dependent on winter and  
33 spring rains for germination and growth in the winter and spring months, not on river stage.  
34 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create  
35 a substantial change in grassland acreage in these areas. Reduced diversions from south Delta  
36 channels would not create a reduction in this natural community.
- 37 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
38 conveyance facilities and levees associated with the BDCP actions have the potential to require  
39 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This  
40 activity could lead to increased soil erosion and runoff entering these habitats. These activities  
41 would be subject to normal erosion and runoff control management practices, including those  
42 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*  
43 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within  
44 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of



1           disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper  
2           implementation of these measures would avoid permanent adverse effects on this community.

- 3           ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
4           treatment, would be a periodic activity associated with the long-term maintenance of water  
5           conveyance facilities and restoration sites(*CM11 Natural Communities Enhancement and*  
6           *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
7           grassland natural community at or adjacent to treated areas. The hazard could be created by  
8           uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the  
9           natural community, or direct discharge of herbicides to grassland areas being treated for  
10          invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment*  
11          *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and  
12          the environment from use of various chemicals during maintenance activities, including the use  
13          of herbicides. These commitments are described in Appendix 3B, including the commitment to  
14          prepare and implement spill prevention, containment, and countermeasure plans and  
15          stormwater pollution prevention plans. Best management practices, including control of drift  
16          and runoff from treated areas, and use of herbicides approved for use in terrestrial  
17          environments would also reduce the risk of affecting natural communities adjacent to water  
18          conveyance features and levees associated with restoration activities.
- 19          ● *Channel dredging.* Long-term operation of the Alternative 1B intakes on the Sacramento River  
20          would include periodic dredging of sediments that might accumulate in front of intake screens.  
21          The dredging could occur adjacent to grassland natural community. This activity should not  
22          permanently reduce the acreage of grassland natural community because it is periodic in  
23          nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with  
24          low habitat value.
- 25          ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
26          communities within the Plan Area (CM11). For the grassland natural community, a management  
27          plan would be prepared that specifies actions to improve the value of the habitats for covered  
28          species. Actions would include control of invasive nonnative plant and animal species, fire  
29          management, restrictions on vector control and application of herbicides, and maintenance of  
30          infrastructure that would allow for movement through the community. The enhancement efforts  
31          would improve the long-term value of this community for both special-status and common  
32          species.

33          The various operations and maintenance activities described above could alter acreage of grassland  
34          natural community in the study area through changes in flow patterns and changes in periodic  
35          inundation of this community. Activities could also introduce sediment and herbicides that would  
36          reduce the value of this community to common and sensitive plant and wildlife species. Other  
37          periodic activities associated with the Plan, including management, protection and enhancement  
38          actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
39          *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
40          community. While some of these activities could result in small changes in acreage, these changes  
41          would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*  
42          *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The  
43          management actions associated with levee repair, periodic dredging and control of invasive plant  
44          species would also result in a long-term benefit to the species associated with grassland habitats by  
45          improving water movement in adjacent waterways and by eliminating competitive, invasive species  
46          of plants.

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

4 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would  
5 have the potential to create minor changes in total acreage of grassland natural community in the  
6 study area, and could create temporary increases sedimentation. The activities could also introduce  
7 herbicides periodically to control nonnative, invasive plants. Implementation of environmental  
8 commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts, and other  
9 operations and maintenance activities, including management, protection and enhancement actions  
10 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
11 *Communities Enhancement and Management*, would create positive effects, including reduced  
12 competition from invasive, nonnative plants in these habitats. Long-term restoration activities  
13 associated with *CM8 Grassland Natural Community Restoration* and protection actions associated  
14 with *CM3 Natural Communities Protection and Restoration* would increase the value of this natural  
15 community in the study area. Ongoing operation, maintenance and management activities would not  
16 result in a net permanent reduction in this natural community within the study area. Therefore,  
17 there would be a less-than-significant impact.

#### 18 **Inland Dune Scrub**

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

#### 25 **Cultivated Lands**

26 Cultivated lands is the major land-cover type in the study area (487,106 acres, see Table 12-1). The  
27 Delta, the Yolo Bypass and the Cache Slough drainage are dominated by various types of agricultural  
28 activities, with crop production the dominant element (see Figure 12-1). Major crops and cover  
29 types in agricultural production include grain and hay crops (wheat, oats and barley), field crops  
30 (corn, beans and safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native  
31 and nonnative pasture), rice, orchards, and vineyards. Tables 12-2 and 12-3 list special-status  
32 wildlife species supported by cultivated lands.

33 The effects of Alternative 1B on cultivated lands are discussed from various perspectives in this  
34 document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as  
35 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and  
36 wildlife species in this chapter also focus on the relevance of cultivated land loss. Because cultivated  
37 lands is not a natural community and because the effects of its loss are captured in the individual  
38 species analyses below, there is no separate analysis of this land cover type presented here. Table  
39 14-8 in Chapter 14, *Agricultural Resources*, provides a comparison of important farmland losses that  
40 would result from construction of CM1 water conveyance facilities for each alternative, and Table  
41 14A-1 in Appendix 14A, *Individual Crop Effects as a Result of BDCP Water Conveyance Facility*  
42 *Construction*, provides a similar comparison for losses of individual crops. Table 12-ES-1 in this  
43 chapter's Summary of Effects identifies the total cultivated lands loss for all project alternatives. For  
44 Alternative 1B, the total temporary and permanent loss is estimated to be 72,778 acres. The

1 majority of the permanent loss would be associated with habitat restoration activities, including  
2 Yolo Bypass fisheries enhancement (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres),  
3 floodplain restoration (CM5; 2,087 acres), riparian natural community restoration (CM7; 960 acres),  
4 grassland restoration (CM8; 2,000 acres) and nontidal marsh restoration (CM10; 1,950 acres).  
5 Construction of the eastern canal alignment water conveyance facilities (CM1) would permanently  
6 remove 7,451 acres of cultivated land.

## 7 **Developed Lands**

8 Additional lands in the study area that were not designated with a natural community type have  
9 been characterized here as developed lands. Developed lands include lands with residential,  
10 industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and other  
11 transportation facilities. Developed lands support some common plant and wildlife species, whose  
12 abundance and species richness vary with the intensity of development. One special-status species,  
13 the giant garter snake, is closely associated with a small element of developed lands; specifically,  
14 embankments and levees near water that are covered with riprap provide habitat for giant garter  
15 snake. There are approximately 90,660 acres of developed lands in the study area.

16 As with cultivated lands, no effort has been made to analyze the effects of BDCP covered actions on  
17 this land cover type. It is not a natural community. The effects of its conversion are discussed in  
18 Chapter 13, *Land Use*. Where the loss of developed lands may affect individual special-status species  
19 or common species, the impact analysis is contained in that species discussion.

## 20 **Wildlife Species**

### 21 **Vernal Pool Crustaceans**

22 This section describes the effects of Alternative 1B, including water conveyance facilities  
23 construction and implementation of other conservation components, on vernal pool crustaceans  
24 (California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp,  
25 vernal pool fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects  
26 for the vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and  
27 uplands that display characteristic vernal pool and swale visual signatures that have not been  
28 significantly affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and  
29 degraded vernal pool complex, which consists of low-value ephemeral habitat ranging from areas  
30 with vernal pool and swale visual signatures that display clear evidence of significant disturbance  
31 due to plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural  
32 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the  
33 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and  
34 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands  
35 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included  
36 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that  
37 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool  
38 plants. These areas do not include topographic depressions that are characteristic of vernal pool  
39 crustacean habitat and, thus, are considered to have a lower value for the species.

40 Construction and restoration associated with Alternative 1B conservation measures would result in  
41 permanent losses (see Table 12-1B-12) and indirect conversions of vernal pool crustacean modeled  
42 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is  
43 restored in the Plan Area. Full implementation of the BDCP would also include the following

1 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,  
2 *Conservation Strategy*).

- 3 • Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
4 recovery areas (Objective VPNC1.1, associated with CM3).
- 5 • Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
6 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
7 VPNC1.2, associated with CM9).
- 8 • Increase size and connectivity of protected vernal pool complexes in plan area and increase  
9 connectivity with complexes outside the Plan Area (Objective VPNC1.3).
- 10 • Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective  
11 VPNC1.4).
- 12 • Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for  
13 supporting and sustaining vernal pool species (Objective VPNC2.1).
- 14 • Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

15 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
16 implementation of AMMs, impacts on vernal pool crustaceans would not be adverse for NEPA  
17 purposes and would be less than significant for CEQA purposes.

18 **Table 12-1B-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative**  
19 **1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1 <sup>c</sup>	High-value	1	1	0	0	NA	NA
	Low-value	3	3	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18 <sup>c</sup>	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0–4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>205</b>	<b>376</b>	<b>0</b>	<b>0</b>	<b>0–4</b>	<b>0</b>

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

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

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

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

NT = near-term

LLT = late long-term

NA = not applicable

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

3 Alternative 1B conservation measures would result in the direct, permanent loss of up to 376 acres  
4 of modeled vernal pool crustacean habitat from conveyance facility construction (CM1) and tidal  
5 natural communities restoration (CM4). In addition, the conservation measures could result in the  
6 indirect conversion due to hydrological changes of an additional 149 acres of vernal pool crustacean  
7 habitat (91 acres of high-value habitat and 58 acres of low-value habitat) from conveyance  
8 construction (CM1) and based on the hypothetical footprints for tidal restoration (CM4).

9 Construction of the water conveyance facilities and restoration activities may result in the  
10 modification of hardpan and changes to the perched water table, which could lead to alterations in  
11 the rate, extent, and duration of inundation of nearby vernal pool crustacean habitat. USFWS  
12 typically considers construction within 250 feet of vernal pool crustacean habitat to constitute an  
13 possible conversion of crustacean habitat unless more detailed information is provided to further  
14 refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer was  
15 applied to the water conveyance facilities work areas where surface and subsurface disturbance  
16 activities would take place and to restoration hypothetical footprints. Habitat enhancement and  
17 management activities (CM11), which include disturbance or removal of nonnative vegetation, could  
18 result in local adverse habitat effects.

19 Alternative 1B would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
20 acres), vernal pool fairy shrimp (270 acres), and vernal pool tadpole shrimp (270 acres) from the  
21 hypothetical tidal restoration (CM4) footprints in CZ 11. *AMM12 Vernal Pool Crustaceans* would  
22 ensure that there would be no adverse modification of the primary constituent elements of critical  
23 habitat for these species.

24 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
25 where restoration may occur, actual effects are expected to be lower because sites would be selected  
26 and restoration projects designed to minimize or avoid effects on the covered vernal pool  
27 crustaceans. As specified in *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali Seasonal*  
28 *Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal restoration  
29 projects and other covered activities would be designed such that no more than a total of 10 wetted  
30 acres of vernal pool crustacean habitat are permanently lost. *AMM12* would also ensure that no  
31 more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected by alterations to  
32 hydrology resulting from adjacent BDCP covered activities. The term *wetted acres* refers to an area  
33 that would be defined by the three parameter wetland delineation method used by the U.S. Army  
34 Corps of Engineers to determine the limits of a wetland, which involves an evaluation of wetland  
35 soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool complex  
36 acreages in that a vernal pool complex is composed of individual wetlands (vernal pools) and those  
37 upland areas that are in between and surrounding them, which provide the supporting hydrology  
38 (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the terrestrial  
39 phase of some vernal pool species.

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

- 42 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would  
43 result in the permanent loss of 4 acres of vernal pool crustacean habitat, composed of 1 acre of  
44 high-value habitat and 3 acres of low-value vernal pool crustacean habitat. These impacts would

1 occur from the construction of a new bridge on Hood Franklin Road where it crosses a large  
2 canal just before the town of Hood and from construction around Clifton Court Forebay. The  
3 bridge expansion area has a record for California linderiella and there are records for vernal  
4 pool fairy shrimp and vernal pool tadpole shrimp just to the east on this property. There are  
5 records of vernal pool fairy shrimp adjacent to the impact areas around Clifton Court forebay. In  
6 addition, 14 acres of vernal pool crustacean habitat (2 acres of high-value habitat and 12 acres  
7 of low-value habitat) could be indirectly affected by the construction around Clifton Court  
8 Forebay and the construction of the aforementioned bridge.

- 9 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
10 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,  
11 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool  
12 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale  
13 visual signatures that display clear evidence of significant disturbance due to plowing, disking,  
14 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions  
15 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
16 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery  
17 found that these habitats appear to generally have low densities. However, areas mapped as  
18 degraded vernal pool complex may still provide habitat for vernal pool crustaceans as evidenced  
19 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella  
20 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Game  
21 2012). Helm (1998) notes that many vernal pool crustaceans can occur in degraded vernal pool  
22 habitats and artificial habitats. In CZ 2 and CZ 4, there are several records of covered vernal pool  
23 crustaceans occurring outside of modeled habitat in areas that appear to be road side ditches. So  
24 though degraded vernal pool complexes may not represent botanically diverse vernal pools they  
25 still can provide habitat for vernal pool crustaceans and thus the loss of 372 acres of degraded  
26 vernal pool complex may result in the loss of occupied vernal pool crustacean habitat. In  
27 addition, tidal restoration could result in the indirect conversion of 135 acres of vernal pool  
28 crustacean habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat.  
29 The hypothetical restoration footprints overlap with a CNDDDB record for vernal pool fairy  
30 shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under  
31 Alternative 1B would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
32 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12*  
33 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the  
34 primary constituent elements of critical habitat for these species.
- 35 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
36 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
37 vernal pool complex would benefit vernal pool crustaceans (Table 12-1B-12). A variety of  
38 habitat management actions included in CM11 that are designed to enhance wildlife values in  
39 BDCP-protected habitats may result in localized ground disturbances that could temporarily  
40 affect vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative  
41 vegetation and road and other infrastructure maintenance, are expected to have minor effects  
42 on vernal pool crustacean habitat and are expected to result in overall improvements to and  
43 maintenance of vernal pool crustacean habitat values over the term of the BDCP. These effects  
44 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
45 the AMMs listed below.

1 The following paragraphs summarize the combined effects discussed above and describe other  
 2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
 3 also included. NEPA and CEQA impact conclusions are also included. Table 12-1B-13 was prepared  
 4 to further analyze BDCP effects on vernal pool crustaceans using wetted acres of vernal pools in  
 5 order to compare to the effects of this alternative with the effect limits established in BDCP Chapter  
 6 3, Section 3.3, *Biological Goals and Objectives*, which are measured in wetted acres of vernal pools.  
 7 Wetted acres were estimated by using the BDCP’s assumption that restored vernal pool complexes  
 8 Pools would have a 15% density of vernal pools (i.e., of 100 acres of vernal pool complex, 15 acres  
 9 would constitute vernal pools and the remaining 85 acres supporting uplands). Based on an  
 10 informal evaluation of aerial photographs of the Plan Area it is likely that the actual densities within  
 11 the Plan Area are approximately 10%, but the 15% density value was chosen as a conservative  
 12 estimate for determining effects.

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

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>		5	10	10	20
Alternative 1B Impact <sup>b</sup>	CM1	0.6	0.6	2.1	2.1
	CM4 <sup>c</sup>	30.2	55.8	11.0	20.4
<b>Total</b>		<b>30.8</b>	<b>56.4</b>	<b>13.1</b>	<b>22.5</b>

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

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

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

15

16 ***Near-Term Timeframe***

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
 18 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
 19 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
 20 the effects of such conveyance facility construction would not be adverse under NEPA and would be  
 21 less than significant under CEQA. Table 12-1B-12 above lists the impacts on modeled vernal pool  
 22 crustacean habitat that is based on the natural community mapping done within the study area. The  
 23 impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints and  
 24 do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP’s commitment  
 25 to design restoration projects to minimize or avoid effects on covered vernal pool crustaceans. As  
 26 seen in Table 12-1B-13, the effects of CM1 alone would be well within the near-term limits. As seen  
 27 in Table 12-1B-13, Alternative 1B would not meet the Plan’s near-term biological goals and  
 28 objectives for direct loss and indirect conversion unless near-term tidal restoration projects are  
 29 designed to ensure that they do not exceed these impact limits.

1 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
2 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
3 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.6  
4 wetted acre of vernal pool crustacean habitat (or 4 acres of vernal pool complex) should be restored  
5 and 5.4 wetted acres of vernal pool crustacean habitat (or 36 acres of vernal pool complex) should  
6 be protected to mitigate the CM1 direct and indirect effects on vernal pool crustacean habitat.  
7 Assuming that the BDCP would apply the impact limits presented in Table 12-1B-13, the effects of  
8 tidal restoration in the near-term could not exceed 4.4 wetted acres direct and 7.9 wetted acres  
9 indirect. The impacts based on the hypothetical tidal restoration footprints would exceed these  
10 limits. When and if these limits are met, the BDCP would need to restore up to 5 wetted acres (33  
11 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool complex)  
12 in the near-term to offset the effects of CM1 and CM4.

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

- 18 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
19 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly  
20 affected (1:1 ratio).
- 21 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
22 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
23 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

24 The species-specific biological goals and objectives would also inform the near-term protection and  
25 restoration efforts. These Plan goals represent performance standards for considering the  
26 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
27 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean  
28 habitat.

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

### 37 **Late Long-Term Timeframe**

38 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
39 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
40 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1B-13, the effects of CM1 alone  
41 would be well within the near-term limits, but overall Alternative 1B would not meet the Plan's late  
42 long-term biological goals and objectives for direct and indirect effects unless tidal restoration  
43 projects are designed to ensure that they do not exceed these impact limits.



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

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

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

18 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 1B would not  
19 be adverse under NEPA because the BDCP has committed to avoiding and minimizing effects from  
20 tidal restoration and to restoring and protecting an acreage that meets or exceeds the typical  
21 mitigation ratios described above. In the absence of other conservation actions, the modification of  
22 vernal pool crustacean habitat and potential mortality of a special-status species resulting from  
23 Alternative 1B in the late long-term would represent an adverse effect. However, the BDCP has  
24 committed to impact limits for vernal pool crustacean habitat and to habitat protection, restoration,  
25 management, and enhancement associated with CM3, CM9, and CM11. This habitat protection,  
26 restoration, management and enhancement would be guided by species-specific goals and  
27 objectives and by AMM1–AMM6, AMM10, AMM12, and AMM37, which would be in place throughout  
28 the period of construction. Considering these commitments, losses and conversion of vernal pool  
29 crustacean habitat and potential mortality under Alternative 1B would not be an adverse effect on  
30 vernal pool crustaceans.

### 31 **CEQA Conclusion:**

#### 32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
36 effects of construction would be less than significant. Table 12-1B-12 above lists the impacts on  
37 modeled vernal pool crustacean habitat that is based on the natural community mapping done  
38 within the study area. The impacts from tidal natural communities restoration (CM4) are based on  
39 hypothetical footprints and do not reflect actual impacts on vernal pool crustacean habitat  
40 considering the BDCP's commitment to design restoration projects to minimize or avoid effects on  
41 covered vernal pool crustaceans. As seen in Table 12-1B-13, the impacts of CM1 alone would be well  
42 within the near-term limits. As seen in Table 12-1B-13, Alternative 1B would not meet the Plan's

1 near-term biological goals and objectives for direct and indirect effects unless near-term tidal  
2 restoration projects are designed to ensure that they do not exceed these impact limits.

3 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
4 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
5 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.6  
6 wetted acre of vernal pool crustacean habitat (or 4 acres of vernal pool complex) should be restored  
7 and 5.4 wetted acres of vernal pool crustacean habitat (or 36 acres of vernal pool complex) should  
8 be protected to mitigate the CM1 direct and indirect effects on vernal pool crustacean habitat.

9 Assuming that the BDCP would apply the impact limits presented in Table 12-1B-13, the near-term  
10 effects of tidal restoration could not exceed 4.4 wetted acres direct and 7.9 wetted acres indirect.  
11 The impacts based on the hypothetical tidal restoration footprints would exceed these limits. When  
12 and if these limits are met, the BDCP would need to restore up to 5 wetted acres (33 acres of vernal  
13 pool complex) and protect up to 30 wetted acres (200 acres of vernal pool complex) in the near-  
14 term to offset the effects of CM1 and CM4.

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

- 20 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
21 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly  
22 affected (1:1 ratio).
- 23 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
24 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
25 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

26 The species-specific biological goals and objectives would also inform the near-term protection and  
27 restoration efforts. These Plan goals represent performance standards for considering the  
28 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
29 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean  
30 habitat.

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

39 The above natural community restoration and protection activities are expected to be concluded in  
40 the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts  
41 to constitute adequate mitigation for CEQA purposes. These commitments, implemented together  
42 with the AMMs and the biological goals and objectives, are more than sufficient to support the  
43 conclusion that the near-term effects of Alternative 1B on vernal pool crustaceans would be less  
44 than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
3 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
4 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1B-13, the effects of CM1 alone  
5 would be well within the near-term limits, but overall Alternative 1B would not meet the Plan's late  
6 long-term biological goals and objectives for direct and indirect effects unless tidal restoration  
7 projects are designed to ensure that that they do not exceed these impact limits.

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

- 15 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 16 ● Protecting the range of inundation characteristics that are currently represented by vernal pool  
17 throughout the Plan Area (Objective VPNC1.4).
- 18 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective  
19 VPC1.1).

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

25 Alternative 1B would result in substantial habitat modifications to vernal pool crustacean habitat in  
26 the absence of other conservation actions. However, the BDCP has committed to impact limits for  
27 vernal pool crustacean habitat and to habitat protection, restoration, management, and  
28 enhancement associated with CM3, CM9, and CM11. These conservation activities would be guided  
29 by species-specific goals and objectives and by AMM1-AMM6, AMM10, AMM12, and AMM37, which  
30 would be in place throughout the construction phase. Considering these commitments, Alternative  
31 1B over the term of the BDCP would not result in a substantial adverse effect through habitat  
32 modifications and would not substantially reduce the number or restrict the range of vernal pool  
33 crustaceans. Therefore, Alternative 1B would have a less-than-significant impact on vernal pool  
34 crustaceans.

35 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

36 Construction and maintenance activities associated with water conveyance facilities, and restoration  
37 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of  
38 construction and restoration areas, and maintenance activities. These potential effects would be  
39 minimized or avoided through AMM1-AMM6, AMM10, and AMM12, which would be in effect  
40 throughout the Plan's construction phase.

41 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
42 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-

1 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could  
2 result in the inadvertent release of sediment and hazardous substances into this habitat. These  
3 potential effects would be avoided and minimized through AMM1–AMM6, which would be in effect  
4 throughout the Plan’s construction phase. Vernal pool crustaceans and their habitat could be  
5 periodically indirectly affected by maintenance activities at water conveyance facilities.  
6 Embankment maintenance activities around Clifton Court Forebay could result in the inadvertent  
7 discharge of sediments and hazardous materials into vernal pool crustacean habitat that occurs  
8 along the southern and western boundaries of the forebays. These potential effects would be  
9 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the  
10 Plan. The indirect effects of Alternative 1B implementation would not be adverse under NEPA.

11 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
12 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in  
13 the vicinity of construction and restoration areas, and maintenance activities. These potential  
14 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would  
15 be in effect throughout the construction phase. The indirect impacts of Alternative 1B would be less-  
16 than significant under CEQA.

17 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of**  
18 **Implementation of Conservation Components**

19 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect 0  
20 to 4 acres of modeled vernal pool crustacean habitat (Table 12-1B-12). There would be no periodic  
21 effects from *CM5 Seasonally Inundated Floodplain Restoration*.

22 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the  
23 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,  
24 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of  
25 habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs. BDCP-  
26 associated inundation of areas that would not otherwise have been inundated is expected to occur in  
27 no more than 30% of all years, because Fremont Weir is expected to overtop the remaining 70% of  
28 all years, and during those years notch operations would not typically affect the maximum extent of  
29 inundation. In more than half of all years under Existing Conditions, an area greater than the BDCP-  
30 related inundation area already inundates in the bypass. Yolo Bypass flooding is expected to have a  
31 minimal effect on vernal pool crustaceans and would not be adverse under NEPA.

32 **CEQA Conclusion:** Alternative 1B would periodically inundate no more than 4 acres of vernal pool  
33 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is  
34 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland  
35 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is  
36 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop  
37 the remaining 70% of all years, and during those years notch operations would not typically affect  
38 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
39 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass  
40 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in  
41 less-than-significant impacts on the species.

**Valley Elderberry Longhorn Beetle**

This section describes the effects of Alternative 1B, including water conveyance facilities construction and implementation of other conservation measures, on the valley elderberry longhorn beetle. That habitat model used to assess the effects for valley elderberry longhorn beetle is based on riparian habitat and nonriparian habitat (channels and grasslands within 200 feet of channels). Construction and restoration associated with Alternative 1B conservation measures would result in both temporary and permanent losses of valley elderberry longhorn beetle modeled habitat as indicated in Table 12-1B-14. The majority of the losses would take place over an extended period of time as the restoration conservation measures are being implemented. In addition, an estimated 23 elderberry shrubs could be impacted by the Alternative 1B conveyance alignment (CM1). Full implementation of Alternative 1B would also include the following conservation actions over the term of the BDCP to benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation Strategy*).

- Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the species (Objective VELB1.1).
- Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective VELB1.2).
- Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7).
- Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3).
- Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances, such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with CM7 and CM11).

As explained below, with the restoration or protection of these amounts of habitat, impacts on valley elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1B-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	51	51	39	39	NA	NA
	Non-riparian	158	158	88	88	NA	NA
<b>Total Impacts CM1</b>		<b>209</b>	<b>209</b>	<b>127</b>	<b>127</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	381	678	76	111	44–80	266
	Non-riparian	142	311	94	108	103–244	287
<b>Total Impacts CM2–CM18</b>		<b>523</b>	<b>989</b>	<b>170</b>	<b>219</b>	<b>161–325</b>	<b>553</b>
<b>TOTAL IMPACTS</b>		<b>732</b>	<b>1,198</b>	<b>297</b>	<b>346</b>	<b>161–325</b>	<b>553</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

- c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.
- d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT	=	near-term
LLT	=	late long-term
NA	=	not applicable

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### **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

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Alternative 1B conservation measures would result in the permanent and temporary loss combined of up to 1,544 acres of modeled valley elderberry longhorn beetle habitat (879 acres of riparian habitat and 665 acres of nonriparian habitat), and an estimated 23 elderberry shrubs, which represent potential habitat for the species (Table 12-1B-14). Due to the limitation of the habitat suitability model, all of these effects are assumed to be a large overestimate of the true effect on potential valley elderberry longhorn beetle habitat. Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term habitat protection and restoration contained in the Plan and implementation of AMMs committed to in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under CEQA. Each of these activities is described below.

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- *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would result in the permanent and temporary combined loss of approximately 336 acres of modeled valley elderberry longhorn beetle habitat, composed of 90 acres of riparian habitat and 246 acres of nonriparian habitat (Table 12-1B-14). In addition, an estimated 23 shrubs could be potentially removed as a result of conveyance facility construction. The exact number of shrubs to be impacted would be determined during pre-construction surveys of the footprints of the conveyance facility and associated work areas as part of the implementation of *AMM15 Valley Elderberry Longhorn Beetle*. Most of these impacts are associated with the intake and forebay construction in the north delta. There are no records of valley elderberry longhorn beetle within these impact areas. The portion of the above impacts that result from temporary habitat loss includes 127 acres of modeled valley elderberry longhorn beetle habitat (39 acres riparian and 88 acres nonriparian habitat). Elderberry shrubs could be affected from ground-disturbing activities associated with conveyance construction footprints, temporary access roads, and staging areas.

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- *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries improvements in the Yolo Bypass would result in the permanent and temporary removal of approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159 acres of riparian habitat and 136 acres of nonriparian habitat. Approximately 125 acres of permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the

1 north end of the Yolo Bypass from Fremont Weir improvements. The 170 acres of temporary  
2 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the  
3 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be  
4 affected from ground-disturbing activities associated with the re-contouring of surface  
5 topography, excavation or modification of channels, levee modification, and removal of riprap  
6 and other protections from channel banks.

- 7 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
8 in the permanent loss of approximately 813 acres of modeled valley elderberry longhorn beetle  
9 habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The majority of  
10 these impacts would be associated with tidal restoration in the Delta and only 42 acres of these  
11 impacts (all nonriparian) would be from tidal restoration in Suisun Marsh. Elderberry shrubs  
12 could be affected from ground-disturbing activities associated with the re-contouring of surface  
13 topography, excavation or modification of channels, type conversion from riparian and  
14 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other  
15 protections from channel banks.
- 16 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
17 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
18 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of  
19 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be  
20 permanent impacts from levee construction and the other half (49 acres) would be temporary  
21 impacts associated with the levee construction. There is one CNDDDB record of valley elderberry  
22 longhorn beetle occurring in CZ 7 just west of Middle River on Union Island. This record and  
23 other elderberry shrubs could be affected from ground-disturbing activities associated with the  
24 re-contouring of surface topography, excavation or modification of channels, levee removal and  
25 modification, and removal of riprap and other protections from channel banks.
- 26 ● *CM11 Natural Communities Enhancement and Management*: Activities associated with natural  
27 communities enhancement and management, such as grazing practices and ground disturbance  
28 or herbicide use in the control of nonnative vegetation, intended to maintain and improve  
29 habitat functions of BDCP protected habitats for covered species could result in loss of  
30 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be  
31 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs  
32 discussed below.
- 33 ● *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground  
34 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
35 disturbances that could affect valley elderberry beetle. Maintenance activities would include  
36 vegetation management, levee and structure repair, and re-grading of roads and permanent  
37 work areas could potentially affect elderberry shrubs occupied by the species. These effects,  
38 however, would be reduced by AMMs described below.

39 The following paragraphs summarize the combined effects discussed above and describe other  
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
41 also included.

#### 42 ***Near-Term Timeframe***

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
2 effects of construction would not be adverse under NEPA and would be less than significant under  
3 CEQA. Alternative 1B would result in permanent and temporary impacts on 1,029 acres of modeled  
4 habitat (547 acres of riparian and 482 acres of nonriparian) for valley elderberry longhorn beetle in  
5 the study area in the near-term. These effects would result from the construction of the water  
6 conveyance facilities (CM1, 90 acres of riparian and 246 acres of nonriparian), and implementing  
7 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration  
8 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 547  
9 acres (84%) of impacts on riparian habitat. Based on limited DWR survey data of the Conveyance  
10 Planning Area (see Appendix 12.C), an estimated 23 elderberry shrubs would be impacted in the  
11 near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
13 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP  
14 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios  
15 would indicate that 90 acres of the riparian habitat should be restored/created and 90 acres of  
16 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle  
17 habitat. The near-term effects of other conservation actions would require 457 acres of riparian  
18 restoration and 457 acres of riparian protection using the same typical NEPA and CEQA ratios (1:1  
19 for restoration and 1:1 for protection).

20 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800  
21 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same  
22 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on  
23 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB1.1 and 1.2, which call for  
24 implementing the USFWS (1999) conservation guidelines for valley elderberry longhorn beetle  
25 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and  
26 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites  
27 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met  
28 through the implementation of CM7 *Riparian Natural Community Restoration*. CM7 *Riparian Natural*  
29 *Community Restoration* specifically calls for the planting of elderberry shrubs in large, contiguous  
30 clusters with a mosaic of associated natives as part of riparian restoration consistent with USFWS  
31 conservation guidelines (U.S. Fish and Wildlife Service 1999a). These Plan goals represent  
32 performance standards for considering the effectiveness of restoration actions. The acres of  
33 protection and restoration contained in the near-term Plan goals and the additional species specific  
34 measures within CM7 satisfy the typical mitigation that would be applied to the project-level effects  
35 of CM1, as well as mitigating the near-term effects of the other conservation measures.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM15 Valley*  
41 *Elderberry Longhorn Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any  
42 ground disturbing activities, the implementation avoidance and minimize measures for any shrubs  
43 that are identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of  
44 these AMMs include elements that avoid or minimize the risk of affecting habitats and species  
45 adjacent to work areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix  
46 3.C.



1 **Late Long-Term Timeframe**

2 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat  
3 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.  
4 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 1,544  
5 acres of modeled valley elderberry longhorn beetle habitat (879 acres of riparian habitat and 665  
6 acres of nonriparian habitat) during the term of the Plan (approximately 5% of the modeled habitat  
7 in the study area). The locations of these losses are described above in the analyses of individual  
8 conservation measures. These losses would not fragment any known populations of valley  
9 elderberry longhorn beetle. The Plan includes a commitment to protect 750 acres of riparian habitat  
10 and restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective  
11 VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied  
12 habitat, which would provide connectivity between occupied and restored habitats and improve the  
13 species' ability to disperse within and outside the Plan Area. Other factors relevant to effects on  
14 valley elderberry longhorn beetle include are listed below.

- 15 ● Habitat loss is widely dispersed throughout the study area and would not be concentrated in  
16 any one location.
- 17 ● There would be a temporal loss of riparian habitat during the near-term evaluation period  
18 because most of the affected riparian vegetation would be removed during the near-term  
19 timeframe, while large quantities of riparian habitat would not be restored until the early and  
20 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of  
21 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan  
22 Area is not known to be currently occupied by the species, because all elderberry shrubs that  
23 are suitable for transplantation would be moved to conservation areas in the Plan Area, and  
24 because most of the affected community is composed of small patches of riparian scrub and  
25 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of  
26 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.
- 27 ● Temporarily disturbed areas would be restored within 1 year following completion of  
28 construction and management activities. Under AMM10, a restoration and monitoring plan  
29 would be developed prior to initiating any construction-related activities associated with the  
30 conservation measures or other covered activities that would result in temporary effects on  
31 natural communities.

32 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
33 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other  
34 actions that overlap with the nonriparian portions of the species model, could result in the  
35 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and  
36 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry  
37 longhorn beetle.

38 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 1B  
39 would not be adverse because the BDCP has committed to restoring and protecting an acreage that  
40 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and  
41 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of  
42 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status  
43 species associated with Alternative 1B in the late long-term would represent an adverse effect.  
44 However, with habitat protection and restoration associated with CM7, guided by species-specific

1 goals and objectives and by AMM1–AMM6, AMM10, and AMM15, which would be in place  
2 throughout the construction period, the effects of Alternative 1B as a whole on valley elderberry  
3 longhorn beetle would not be adverse under NEPA.

4 **CEQA Conclusion:**

5 **Near-Term Timeframe**

6 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
7 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
8 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
9 impacts of construction would be less than significant. Alternative 1B would result in permanent  
10 and temporary impacts on 1,029 acres of modeled habitat (547 acres of riparian and 482 acres of  
11 nonriparian) for valley elderberry longhorn beetle in the study area in the near-term. These impacts  
12 would result from the construction of the water conveyance facilities (CM1, 90 acres of riparian and  
13 246 acres of nonriparian), and implementation of other conservation measures (Yolo Bypass  
14 fisheries improvements [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). The other  
15 conservation measures account for 457 of the 547 acres (84%) of impacts on riparian habitat. Based  
16 on limited DWR survey data of the Conveyance Planning Area (see Appendix 12C), an estimated 23  
17 elderberry shrubs would be impacted in the near-term by CM1 (see Section 12.3.2.3 for a discussion  
18 on the methods used to make this estimate).

19 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
20 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn  
21 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian  
22 habitat. Using these typical ratios would indicate that 90 acres of the riparian habitat should be  
23 restored/created and 90 acres of existing riparian should be protected to mitigate the CM1 losses of  
24 valley elderberry longhorn beetle habitat. The near-term effects of other conservation actions would  
25 require 457 acres of riparian restoration and 457 acres of riparian protection using the same typical  
26 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

27 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800  
28 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same  
29 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on  
30 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB1.1 and 1.2, which call for  
31 implementing the USFWS conservation guidelines for valley elderberry longhorn beetle  
32 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and  
33 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites  
34 confirmed to be occupied by valley elderberry longhorn beetle (U.S. Fish and Wildlife Service 1999).  
35 These objectives would be met through the implementation of *CM7 Riparian Natural Community  
36 Restoration*. CM7 specifically calls for the planting of elderberry shrubs in large, contiguous clusters  
37 with a mosaic of associated natives as part of riparian restoration consistent with USFWS  
38 conservation guidelines (U.S. Fish and Wildlife Service 1999a).

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2  
40 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention  
41 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and  
42 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
43 Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM15 Valley  
44 Elderberry Longhorn Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any

1 ground disturbing activities, the implementation avoidance and minimize measures for any shrubs  
2 that are identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of  
3 these AMMs include elements that avoid or minimize the risk of affecting habitats and species  
4 adjacent to work areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix  
5 3.C.

6 The natural community restoration and protection activities are expected to be concluded in the  
7 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
8 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with  
9 the AMMs, are more than sufficient to support the conclusion that the near-term effects of  
10 Alternative 1B would be less than significant under CEQA.

### 11 **Late Long-Term Timeframe**

12 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 1,544  
13 acres of modeled valley elderberry longhorn beetle habitat (879 acres of riparian habitat and 665  
14 acres of nonriparian habitat) during the term of the Plan (approximately 5% of the modeled habitat  
15 in the study area). The locations of these losses are described above in the analyses of individual  
16 conservation measures. These losses would not fragment any known populations of valley  
17 elderberry longhorn beetle. The Plan includes a commitment to protect 750 acres of riparian habitat  
18 and restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective  
19 VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied  
20 habitat, which would provide connectivity between occupied and restored habitats and improve the  
21 species' ability to disperse within and outside the Plan Area. The BDCP also includes a number of  
22 AMMs (AMM1–AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts  
23 on valley elderberry longhorn beetle. The large acreages of conservation would adequately  
24 compensate for the modeled habitats lost to construction and restoration activities.

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
26 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other  
27 actions that overlap with the nonriparian portions of the species model, could result in the  
28 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and  
29 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry  
30 longhorn beetle.

31 Considering these protection and restoration provisions, which would provide acreages of new or  
32 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
33 and restoration activities, implementation of Alternative 1B as a whole would not result in a  
34 substantial adverse effect through habitat modifications and would not substantially reduce the  
35 number or restrict the range of the species. Therefore, the alternative would have a less-than-  
36 significant impact on valley elderberry longhorn beetle.

### 37 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

38 Construction activities associated with water conveyance facilities, conservation components and  
39 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
40 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
41 postconstruction disturbances with localized impacts on valley elderberry longhorn beetle over the  
42 term of the BDCP. Construction related effects could result from ground-disturbing activities,  
43 stockpiling of soils, and maintenance and refueling of heavy equipment could result in dust and the

1 inadvertent release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis  
2 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that  
3 approximately 15 shrubs could be indirectly affected by conveyance facilities construction (CM1).  
4 Restoration activities could result in excavation or modification of channels, type conversion from  
5 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap and  
6 other protections from channel banks that occur within 100 feet of an elderberry shrubs. These  
7 potential effects would be minimized or avoided through AMM1–AMM6, AMM10, and AMM15,  
8 which would be in effect throughout the Plan’s construction phase.

9 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing  
10 Alternative 1B conservation actions would not have an adverse effect on valley elderberry longhorn  
11 beetle.

12 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust  
13 and hazardous substances would accompany construction of the water conveyance facilities. An  
14 estimated 15 shrubs could be indirectly affected by conveyance facilities construction (CM1). In  
15 addition, ground-disturbing activities associated with the re-contouring of surface topography,  
16 excavation or modification of channels, type conversion from riparian and grasslands to tidal  
17 habitat, levee removal and modification, and removal of riprap and other protections from channel  
18 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration  
19 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 1B  
20 construction, operation, and maintenance, the BDCP would avoid the potential for substantial  
21 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a  
22 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.  
23 Indirect effects of Alternative 1B implementation would not have a significant impact on valley  
24 elderberry longhorn beetle.

25 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat**  
26 **as a Result of Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
28 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-1B-14).

29 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled  
30 valley elderberry longhorn beetle habitat (Table 12-1B-14).

31 It is unknown at this time how much of the modeled habitat that would be inundated as a result of  
32 CM2 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be  
33 intolerant of long periods of inundation and there is evidence that they die very quickly after even  
34 short periods of flooding (River Partners 2008). During monitoring of a restoration project at the  
35 San Joaquin River National Wildlife Refuge, River Partners found that nearly all (99% to 100%) of  
36 the 4-year-old elderberry shrubs in restoration plots died after 15–17 weeks of inundation, and  
37 River Partners noted in general that the shrubs died very quickly after even short periods of  
38 flooding (River Partners 2008). Talley et al (2006) in their report assisting the USFWS 5-year review  
39 of the species, note that elderberry shrubs respond negatively to saturated soil conditions and that  
40 they can only tolerate temporary root crown inundation. Therefore, in the areas that would be  
41 periodically inundated by the implementation of CM2 it is likely that there are few, if any, mature  
42 shrubs in these areas because under current conditions they would be inundated in about 50% of all  
43 years for approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus  
44 elderberry shrubs could present in these areas.

1 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with  
2 implementing Alternative 1B could adversely affect valley elderberry longhorn beetle habitat  
3 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry  
4 establishment. Based on the information presented above, the current conditions in those areas that  
5 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry  
6 shrubs and thus CM2 would likely have minimal effects, if any, on the species. The modeled habitat  
7 that would be periodically inundated from the implementation of CM5 could result in adverse effects  
8 on valley elderberry longhorn beetle.

9 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a  
10 result of implementing Alternative 1B conservation actions would not be adverse when taking into  
11 consideration CM7 habitat protection and restoration. This habitat protection and restoration would  
12 be guided by species-specific goals and objectives and by AMM1–AMM6, AMM10, and AMM15,  
13 which would be in place throughout the period when periodic effects would occur.

14 **CEQA Conclusion:** Alternative 1B (CM2 and CM5) would have periodic impacts on modeled valley  
15 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)  
16 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may  
17 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the  
18 restoration of 5,000 acres of riparian habitat and the protection of 750 acres riparian habitat (CM7)  
19 would include areas for elderberry restoration and protection. The BDCP also includes AMM1–  
20 AMM6, AMM10, and AMM15, which would minimize and avoid impacts on valley elderberry  
21 longhorn beetle prior to Yolo Bypass fisheries enhancement and floodplain restoration activities.  
22 AMM15, which includes a measure for following the USFWS (U.S. Fish and Wildlife Service 1999a)  
23 conservation guidelines for valley elderberry longhorn beetle, would be used to identify shrubs for  
24 transplanting to conservation areas that otherwise could be adversely affected by periodic  
25 inundation in Yolo Bypass and floodplain restoration areas. These conservation actions would  
26 compensate for the periodic impacts on valley elderberry longhorn beetle.

27 Considering these protection and restoration provisions and avoidance and minimization measures,  
28 implementation of Alternative 1B as a whole would not result in a substantial adverse effect through  
29 habitat modifications and would not substantially reduce the number or restrict the range of the  
30 species. Therefore, periodic effects of inundation resulting from Alternative 1B would have a less-  
31 than-significant impact on valley elderberry longhorn beetle.

### 32 **Nonlisted Vernal Pool Invertebrates**

33 This section describes the effects of Alternative 1B, including water conveyance facilities  
34 construction and implementation of other conservation components, on nonlisted vernal pool  
35 invertebrates that are not covered by the Plan (Blennosperma vernal pool andrenid bee, hairy water  
36 flea, Ricksecker's water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle).  
37 Little is known about the range of these species so it is assumed that they have potential to occur in  
38 the same areas described by the vernal pool crustacean modeled habitat. That habitat model  
39 consists of: vernal pool complex, which consists of vernal pools and uplands that display  
40 characteristic vernal pool and swale visual signatures that have not been significantly affected by  
41 agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool  
42 complex, which consists of low-value ephemeral habitat ranging from areas with vernal pool and  
43 swale visual signatures that display clear evidence of significant disturbance due to plowing, disking,  
44 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in

1 fallow fields, and areas of compacted soils in pastures. For the purpose of the effects analysis, vernal  
2 pool complex is categorized as high-value and degraded vernal pool complex is categorized as low-  
3 value for these species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for  
4 vernal pool crustaceans in the model. Also included as low-value for vernal pool habitat are areas  
5 along the eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood  
6 seasonally and support typical vernal pool plants. These areas do not include topographic  
7 depressions that are characteristic of vernal pools and, thus, are considered to have a lower value  
8 for the species.

9 Construction and restoration associated with Alternative 1B conservation measures would result in  
10 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-1B-15  
11 and indirect conversion of vernal pool habitat. The majority of the losses would take place over an  
12 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
13 Alternative 1B would also include the following conservation actions over the term of the BDCP that  
14 would benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 15 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
16 recovery areas (ObjectiveVPNC1.1, associated with CM3).
- 17 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
18 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
19 VPNC1.2, associated with CM9).
- 20 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase  
21 connectivity with complexes outside the Plan Area (ObjectiveVPNC1.3)
- 22 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective  
23 VPNC1.4)
- 24 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for  
25 supporting and sustaining vernal pool species (Objective VPNC2.1)

26 As explained below, with the restoration or protection of these amounts of habitat, impacts on  
27 nonlisted vernal pool invertebrates would not be adverse for NEPA purposes and would be less-than  
28 significant for CEQA purposes.

1 **Table 12-1B-15 Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with Alternative**  
2 **1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	1	1	0	0	NA	NA
	Low-value	3	3	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>205</b>	<b>376</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term  
LLT = late long-term  
NA = not applicable

3

4 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**  
5 **Pool Invertebrates**

6 Alternative 1B conservation measures would result in the direct permanent loss of up to 376 acres  
7 of vernal pool habitat from conveyance facility construction (CM1) and tidal natural communities  
8 restoration (CM4). In addition, the conservation measures could result in the indirect conversion  
9 due to hydrologic changes of an additional 149 acres of vernal pool habitat (91 high-value habitat  
10 and 58 acres of low-value habitat) from conveyance construction (CM1) and based on the  
11 hypothetical footprints for tidal restoration (CM4). Construction of the water conveyance facilities  
12 and restoration activities may result in the modification of hardpan and changes to the perched  
13 water table, which could lead to alterations in the rate, extent, and duration of inundation of nearby  
14 vernal pool habitat. USFWS typically considers construction within 250 feet of vernal pool habitat to  
15 constitute a possible conversion of the habitat unless more detailed information is provided to  
16 further refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer was  
17 applied to the water conveyance facilities work areas where surface and subsurface disturbance  
18 activities would take place and to restoration hypothetical footprints. Habitat enhancement and  
19 management activities (CM11), which include disturbance or removal of nonnative vegetation, could  
20 result in local adverse habitat effects.

21 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
22 where restoration may occur, actual effects are expected to be lower because sites would be selected  
23 and restoration projects designed to minimize or avoid effects on the vernal pools. As specified in

1 the BDCP, the BDCP Implementation Office would ensure that tidal restoration projects and other  
2 covered activities would be designed such that no more than a total of 10 wetted acres of vernal  
3 pool habitat are permanently lost. *AMM12 Vernal Pool Crustaceans* would ensure that no more than  
4 20 wetted acres of vernal pool habitat are indirectly affected by alterations to hydrology resulting  
5 from adjacent BDCP covered activities, in particular tidal restoration. The term *wetted acres* refers  
6 to an area that would be defined by the three parameter wetland delineation method used by the  
7 U.S. Army Corps of Engineers to determine the limits of a wetland, which involves an evaluation of  
8 wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool  
9 complex acreages in that a vernal pool complex is comprised of individual wetlands (vernal pools)  
10 and those upland areas that are in between and surrounding them, which provide the supporting  
11 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the  
12 terrestrial phase of some vernal pool species.

13 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
14 individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would  
16 result in the permanent loss of 4 acres of vernal pool habitat, composed of 1 acre of high-value  
17 habitat and 3 acres of low-value vernal pool habitat. These impacts would occur from the  
18 construction of a new bridge on Hood Franklin Road where it crosses a large canal just before  
19 the town of Hood and from construction around Clifton Court Forebay. In addition, 14 acres of  
20 vernal pool habitat (2 acres of high-value habitat and 12 acres of low-value habitat) could be  
21 indirectly affected by the construction around Clifton Court Forebay and the construction of the  
22 aforementioned bridge.
- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
24 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which  
25 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as  
26 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual  
27 signatures that display clear evidence of significant disturbance due to plowing, disking, or  
28 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in  
29 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
30 other aquatic features in these areas is unknown but from a 2012 review of Google Earth  
31 imagery found that these habitats appear to generally have low densities. However, areas  
32 mapped as degraded vernal pool complex may still provide habitat for nonlisted vernal pool  
33 invertebrates. So though degraded vernal pool complexes may not represent botanically diverse  
34 vernal pools they still can provide habitat for nonlisted vernal pool invertebrates and thus the  
35 loss of 372 acres of degraded vernal pool complex may result in the loss of occupied nonlisted  
36 vernal pool invertebrate habitat. In addition, tidal restoration could result in the indirect  
37 conversion of 135 acres of vernal pool habitat, which consist of 90 acres of high-value and 45  
38 acres of low-value habitat. No records of nonlisted vernal pool invertebrates would be directly  
39 impacted by CM4.
- 40 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
41 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
42 vernal pool complex would benefit nonlisted vernal pool invertebrates (Table 12-1B-15). A  
43 variety of habitat management actions included in CM11 that are designed to enhance wildlife  
44 values in BDCP-protected habitats may result in localized ground disturbances that could  
45 temporarily affect vernal pool habitat. Ground-disturbing activities, such as removal of



1 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
2 minor effects on vernal pool habitat and are expected to result in overall improvements to and  
3 maintenance of vernal pool habitat values over the term of the BDCP. These effects cannot be  
4 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs  
5 listed below.

6 The following paragraphs summarize the combined effects discussed above and describe other  
7 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
8 also included. NEPA and CEQA impact conclusions are also included. Table 12-1B-16 was prepared  
9 to further analyze BDCP effects on nonlisted vernal pool invertebrates using wetted acres of vernal  
10 pools in order to compare the effects of this alternative with the effect limits established in BDCP  
11 Chapter 3, Section 3.3, *Biological Goals and Objectives*, which are measured in wetted acres of vernal  
12 pools. Wetted acres were estimated by using the BDCP's assumption that vernal pool and degraded  
13 vernal pool complexes would have a 15% density of vernal pools (i.e., of 100 acres of vernal pool  
14 complex 15 acres would constitute vernal pools and the remaining 85 acres supporting uplands).  
15 Based on an informal evaluation of aerial photographs of the Plan Area it is likely that the actual  
16 densities within the Plan Area are approximately 10%, but the 15% density value was chosen as a  
17 conservative estimate for determining effects.

18 **Table 12-1B-16. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 1B**  
19 **(acres)<sup>a</sup>**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>		5	10	10	20
Alternative 1B	CM1	0.6	0.6	2.1	2.1
Impact <sup>b</sup>	CM4 <sup>c</sup>	30.2	55.8	11.0	20.4
<b>Total</b>		<b>30.8</b>	<b>56.4</b>	<b>13.1</b>	<b>22.5</b>

<sup>a</sup> Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

<sup>b</sup> These acreages were generated by assuming that the modeled habitat identified in Table 12-1B-15 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

<sup>c</sup> These impacts are based on the hypothetical restoration footprints and will likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

20  
21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
24 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
25 effects of construction would not be adverse under NEPA and would be less than significant under  
26 CEQA. Table 12-1B-15 above lists the effects on habitat for nonlisted vernal pool invertebrates that  
27 is based on the natural community mapping done within the study area. The impacts from tidal  
28 natural communities restoration (CM4) are based on hypothetical footprints and do not reflect  
29 actual impacts on vernal pool habitat considering the BDCP's commitment to design restoration

1 projects to minimize or avoid effects on vernal pool. As seen in Table 12-1B-16, the effects of CM1  
2 alone would be well within the near-term limits. As seen in Table 12-1B-16, Alternative 1B would  
3 not meet the Plan's near-term biological goals and objectives for direct and indirect effects unless  
4 near-term tidal restoration projects are designed to ensure that they do not exceed these impact  
5 limits.

6 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
7 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
8 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.6  
9 wetted acre of nonlisted vernal pool species habitat (or 4 acres of vernal pool complex) should be  
10 restored and 5.4 wetted acres of nonlisted vernal pool species habitat (or 36 acres of vernal pool  
11 complex) should be protected to mitigate the CM1 direct and indirect effects on nonlisted vernal  
12 pool invertebrate habitat. Assuming that the BDCP would apply the impact limits presented in Table  
13 12-1B-16, the near-term effects of tidal restoration in the near-term could not exceed 4.4 wetted  
14 acres direct and 7.9 wetted acres indirect. The impacts based on the hypothetical tidal restoration  
15 footprints would exceed these limits. When and if these limits are met, the BDCP would need to  
16 restore up to 5 wetted acres (33 acres of vernal pool complex) and protect up to 30 wetted acres  
17 (200 acres of vernal pool complex) in the near-term to offset the effects of CM1 and CM4.

18 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
19 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
20 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
21 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
22 restoration would be determined during implementation based on the following criteria.

- 23 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
24 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly  
25 affected (1:1 ratio).
- 26 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
27 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
28 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

29 The species-specific biological goals and objectives would also inform the near-term protection and  
30 restoration efforts. These Plan goals represent performance standards for considering the  
31 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
32 term Plan goals would keep pace with the loss of habitat and effects nonlisted vernal pool  
33 invertebrates.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM37 Recreation*.  
39 *AMM12 Vernal Pool Crustaceans*, though developed for vernal pool crustaceans, includes measures  
40 to avoid and minimize direct and indirect effects on vernal pools and would thus be applicable to  
41 nonlisted vernal pool invertebrates as well. All of these AMMs include elements that avoid or  
42 minimize the risk of affecting habitats and species adjacent to work areas. The AMMs are described  
43 in detail in BDCP Appendix 3.C.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
3 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
4 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1B-16, the effects of CM1 alone  
5 would be well within the near-term limits, but overall Alternative 1B would not meet the Plan's late  
6 long-term biological goals and objectives for direct and indirect effects unless tidal restoration  
7 projects are designed to ensure that that they do not exceed these impact limits.

8 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
9 Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective VPNC1.1) by  
10 protecting at least 2 wetted acres of vernal pools protected for each wetted acre directly or  
11 indirectly affected. The Plan also includes a commitment to restore or create vernal pools such that  
12 the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection and  
13 restoration would be achieved using the criteria presented above as well as by following these other  
14 specific biological goals and objectives.

- 15 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 16 ● Protecting the range of inundation characteristics that are currently represented by vernal pool  
17 throughout the Plan Area (Objective VPNC1.4).

18 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 1B would not be adverse  
19 because the BDCP has committed to avoiding and minimizing effects from tidal restoration and to  
20 restoring and protecting an acreage that meets or exceeds the typical mitigation ratios described  
21 above. In the absence of other conservation actions, the potential modification of vernal pool habitat  
22 and potential mortality of special-status species resulting from Alternative 1B in the late long-term  
23 would represent an adverse effect. However, the BDCP has committed to impact limits for vernal  
24 pool habitat and to habitat protection, restoration, management, and enhancement associated with  
25 CM3, CM9, and CM11. This habitat protection, restoration, management, and enhancement would be  
26 guided by species-specific goals and objectives and by AMM1-AMM6, AMM10, AMM12, and AMM37,  
27 which would be in place throughout the time period of construction. Considering these  
28 commitments, losses and conversions of nonlisted vernal pool invertebrates habitat and potential  
29 mortality under Alternative 1B would not be an adverse effect.

30 **CEQA Conclusion:**

31 **Near-Term Timeframe**

32 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
33 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
34 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
35 impacts of construction be less than significant. Table 12-1B-15 lists the impacts on vernal pool  
36 habitat that is based on the natural community mapping done within the study area. The impacts  
37 from tidal natural communities restoration (CM4) are based on hypothetical footprints and do not  
38 reflect actual impacts on nonlisted vernal pool invertebrate habitat considering the BDCP's  
39 commitment to design restoration projects to minimize or avoid effects on vernal pools. As seen in  
40 Table 12-1B-16, the effects of CM1 alone would be well within the near-term limits. As seen in Table  
41 12-1B-16, Alternative 1B would not meet the Plan's near-term biological goals and objectives for  
42 direct and indirect effects unless near-term tidal restoration projects are designed to ensure that  
43 they do not exceed these impact limits.

1 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
2 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
3 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.6  
4 wetted acre of nonlisted vernal pool species habitat (or 4 acres of vernal pool complex) should be  
5 restored and 5.4 wetted acres of nonlisted vernal pool species habitat (or 36 acres of vernal pool  
6 complex) should be protected to mitigate the CM1 direct and indirect effects on nonlisted vernal  
7 pool invertebrate habitat. Assuming that the BDCP would apply the impact limits presented in Table  
8 12-1B-16, the near-term effects of tidal restoration could not exceed 4.4 wetted acres direct and 7.9  
9 wetted acres indirect. The impacts based on the hypothetical tidal restoration footprints would  
10 exceed these limits. When and if these limits are met, the BDCP would need to restore up to 5 wetted  
11 acres (33 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool  
12 complex) in the near-term to offset the effects of CM1 and CM4.

13 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
14 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
15 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
16 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
17 restoration would be determined during implementation based on the following criteria.

- 18 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
19 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly  
20 affected (1:1 ratio).
- 21 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
22 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
23 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

24 The species-specific biological goals and objectives would also inform the near-term protection and  
25 restoration efforts. These Plan goals represent performance standards for considering the  
26 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
27 term Plan goals would keep pace with the loss of habitat and effects on vernal pool habitat.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM37 Recreation*.  
33 *AMM12 Vernal Pool Crustaceans*, though developed for vernal pool crustaceans, includes measures  
34 to avoid and minimize direct and indirect effects on vernal pools and would thus be applicable to  
35 nonlisted vernal pool invertebrates as well. All of these AMMs include elements that avoid or  
36 minimize the risk of affecting habitats and species adjacent to work areas. The AMMs are described  
37 in detail in BDCP Appendix 3.C.

38 The above natural community restoration and protection activities are expected to be concluded in  
39 the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts  
40 to constitute adequate mitigation for CEQA purposes. These commitments, implemented together  
41 with the AMMs and the biological goals and objectives, are more than sufficient to support the  
42 conclusion that the near-term impacts of Alternative 1B on nonlisted vernal pool invertebrates  
43 would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
3 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term (see  
4 Objective VPNC1.2 and AMM12). As seen in Table 12-1B-16, the effects of CM1 alone would be well  
5 within the near-term limits, but overall Alternative 1B would not meet the Plan's late long-term  
6 biological goals and objectives for direct and indirect effects unless tidal restoration projects are  
7 designed to ensure that that they do not exceed these impact limits.

8 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in  
9 Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective VPNC1.1) by  
10 protecting at least 2 wetted acres of vernal pools protected for each wetted acre directly or  
11 indirectly affected. The Plan also includes a commitment to restore or create vernal pools such that  
12 the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection and  
13 restoration would be achieved using the criteria presented above as well as by following these other  
14 specific biological goals and objectives.

- 15 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 16 ● Protecting the range of inundation characteristics that are currently represented by vernal pool  
17 throughout the Plan Area (Objective VPNC1.4).

18 Alternative 1B would result in substantial habitat modifications to vernal pool habitat in the absence  
19 of other conservation actions. However, the BDCP has committed to impact limits for vernal pool  
20 habitat and to habitat protection, restoration, management, and enhancement associated with CM3,  
21 CM9, and CM11. These conservation activities would be guided by goals and objectives and by  
22 AMM1–AMM6, AMM10, AMM12, and AMM37, which would be in place throughout the time period of  
23 construction, Alternative 1B over the term of the BDCP would not result in a substantial adverse  
24 effect through habitat modifications and would not substantially reduce the number or restrict the  
25 range of nonlisted vernal pool invertebrates. Therefore, Alternative 1B would have a less-than-  
26 significant impact on nonlisted vernal pool invertebrates.

27 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool**  
28 **Invertebrates**

29 Construction and maintenance activities associated with water conveyance facilities, and restoration  
30 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of  
31 construction and restoration areas, and maintenance activities. These potential effects would be  
32 minimized or avoided through AMM1–AMM6, AMM10, and AMM12 which would be in effect  
33 throughout the Plan's construction phase.

34 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
35 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.  
36 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment  
37 could result in the inadvertent release of sediment and hazardous substances into this habitat.  
38 These potential effects would be avoided and minimized through AMM1–AMM6, which would be in  
39 effect throughout the Plan's construction phase. Nonlisted vernal pool invertebrates and their  
40 habitat could be periodically indirectly affected by maintenance activities at water conveyance  
41 facilities. Embankment maintenance activities around Clifton Court Forebay could result in the  
42 inadvertent discharge of sediments and hazardous materials into vernal pool habitat that occurs  
43 along the southern and western boundaries of the forebays. These potential effects would be

1 avoided and minimized through AMM1–AMM6 and AMM10 which would be in effect throughout the  
2 term of the Plan. The indirect effects of Plan implementation under Alternative 1B would not be  
3 adverse.

4 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
5 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and  
6 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These  
7 potential impacts would be minimized or avoided through AMM1–AMM6 and AMM10, which would  
8 be in effect throughout the Plan’s construction phase. These indirect effects of Alternative 1B would  
9 have a less-than significant impact on nonlisted vernal pool invertebrates.

#### 10 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates’ Habitat** 11 **as a Result of Implementation of Conservation Components**

12 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect 0  
13 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-1B-15). There would  
14 be no periodic effects from *CM5 Seasonally Inundated Floodplain Restoration*.

15 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the  
16 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,  
17 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0  
18 acres of habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs.  
19 BDCP-associated inundation of areas that would not otherwise have been inundated is expected to  
20 occur in no more than 30% of all years, because Fremont Weir is expected to overtop the remaining  
21 70% of all years, and during those years notch operations will not typically affect the maximum  
22 extent of inundation. In more than half of all years under Existing Conditions, an area greater than  
23 the BDCP-related inundation area already inundates in the bypass. Yolo Bypass flooding is expected  
24 to have a minimal effect on nonlisted vernal pool invertebrates and would not be adverse.

25 **CEQA Conclusion:** Alternative 1B would periodically inundate at most 4 acres of nonlisted vernal  
26 pool invertebrates’ habitat during the maximum flows over the Fremont Weir. The periodic  
27 inundation is not anticipated to result in a conversion of nonlisted vernal pool invertebrates’ habitat  
28 into different wetland habitat. BDCP-associated inundation of areas that would not otherwise have  
29 been inundated is expected to occur in no more than 30% of all years, because Fremont Weir is  
30 expected to overtop the remaining 70% of all years, and during those years notch operations will  
31 not typically affect the maximum extent of inundation. In more than half of all years under Existing  
32 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.  
33 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and  
34 would thus result in less-than-significant impacts on the species.

#### 35 **Sacramento and Antioch Dunes Anthicid Beetles**

36 Potential habitat for Sacramento and Antioch Dunes anthicid beetles in the study area consists of the  
37 inland dune scrub habitat at Antioch Dunes NWR, sand bars along the Sacramento and San Joaquin  
38 Rivers, and sandy dredge spoil piles (California Department of Fish and Game 2006c and 2006d).

39 The construction, and operations and maintenance of the water conveyance facilities under  
40 Alternative 1B would not likely affect Sacramento and Antioch Dunes anthicid beetles. The  
41 construction of the water conveyance structure and associated infrastructure would generally avoid  
42 affects to channel margins where sand bars are likely to form. Conveyance facilities construction

1 would not affect inland dune scrub habitat at Antioch Dunes NWR. No dredge spoil areas that could  
2 potentially be occupied by Sacramento anthicid beetle were identified within conveyance facilities  
3 footprints during a review of Google Earth imagery. Also, a review of the locations of the Alternative  
4 1B water intake facilities on Google Earth imagery did not reveal any sandbars along the channel  
5 margins. These portions of the Sacramento River have steep, riprap lined channel banks that are  
6 likely not conducive to the formation of sandbars.

7 Implementation of BDCP restoration based conservation measures could affect habitat for  
8 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand  
9 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch  
10 Dunes, which would not be impacted by the Alternative 1B conservation measures. Both species are  
11 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP  
12 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch  
13 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these  
14 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping  
15 done within the study area. Because of current and historic channel modifications (channel  
16 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely  
17 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*  
18 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*  
19 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy dredge piles  
20 on Delta islands.

21 Over the term of the BDCP, Alternative 1B would likely result in beneficial effects on Sacramento and  
22 Antioch Dunes anthicid beetles. The following Alternative 1B objectives would generally increase  
23 opportunities for the formation of sandbars in the Plan Area.

- 24 ● Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5).
- 25 ● Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6).
- 26 ● Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored  
27 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

28 These measures would improve shoreline conditions by creating benches along levees, shallow  
29 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would  
30 likely contribute to the formation of sandbars along Delta river channels where these measures  
31 would be implemented. Increasing the structural diversity of Delta river channel margins and  
32 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently  
33 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetles  
34 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-17. Changes in Sacramento Anthicid Beetle and Antioch Dunes Anthicid Beetle**  
2 **Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**  
5 **Antioch Dunes Anthicid Beetles**

6 Implementation of Alternative 1B conservation measures could potentially affect Sacramento and  
7 Antioch Dunes anthicid beetles and their habitat. As mentioned above, the extent of this habitat in  
8 the study area is unknown but it is assumed that sand bars likely occur along to some degree along  
9 the Sacramento and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge  
10 spoil piles. A 2012 review of Google Earth imagery of the north Delta did identify three general areas  
11 that appear to have accumulations of sandy soils (with some vegetation), possibly from dredge  
12 disposal, are Decker Island, the western portion of Bradford Island, and the southwestern tip of  
13 Grand Island. A review of Google Earth imagery of the south Delta did identify sandbar habitat along  
14 the San Joaquin River from the southern end of the Plan Area downstream to an area just west of  
15 Lathrop. An additional area along Paradise Cut was identified just north of I-5. Conservation  
16 measures that could result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal  
17 natural communities restoration (CM4), seasonally inundated floodplain restoration (CM5), and  
18 channel margin enhancement (CM6). In addition, maintenance activities associated with the long-  
19 term operation of the water conveyance facilities and other BDCP physical facilities could degrade  
20 or eliminate habitat for Sacramento and Antioch Dunes anthicid beetles. Each of these individual  
21 activities is described below. A summary statement of the combined impacts and NEPA and CEQA  
22 conclusions follows the individual conservation measure discussions.

- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration could  
24 potentially impact the areas of sandy soils identified from aerial photographs on Decker Island,  
25 the western portion of Bradford Island, and on the southwestern tip of Grand Island because



1 these areas fall within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA  
2 has been identified in the BDCP (BDCP Chapter 3, *Conservation Strategy*, Section 3.4.4) as  
3 providing opportunities for creating subtidal aquatic and tidal marsh habitats. The methods and  
4 techniques identified in BDCP Chapter 3, Section 3.4.4.3.3 that may be used for tidal restoration  
5 include the recontouring of lands so that they have elevations suitable for the establishment of  
6 marsh plains and the eventual breaching of levees. There are three CNDDDB records of  
7 Sacramento anthicid beetle (just north of Rio Vista, one just south of Rio Vista along the west  
8 shore of the Sacramento River, and one on Grand Island) and one CNDDDB record of Antioch  
9 Dunes anthicid beetle (just north of Rio Vista) that fall within the West Delta ROA (California  
10 Department of Fish and Wildlife 2013). Tidal restoration actions in the West Delta ROA may  
11 eliminate potential habitat and impact occupied habitat of both Sacramento and Antioch Dunes  
12 anthicid beetles.

- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Seasonally inundated floodplain restoration  
14 could potentially impact areas with sandbars that were identified in a review of aerial  
15 photographs. The sandbars identified along the San Joaquin River and Paradise Cut are within  
16 the conceptual corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP.  
17 There are four CNDDDB records for Sacramento anthicid beetle in the conceptual corridor along  
18 the San Joaquin River (California Department of Fish and Wildlife 2013). Floodplain restoration  
19 actions in these conceptual corridors could impact potential habitat for both these species and  
20 occupied habitat of Sacramento anthicid beetle.
- 21 ● *CM6 Channel Margin Enhancement*: Channel margin enhancement could result in impacts on 20  
22 miles of channel margin that could contain sandbars.

23 The following paragraphs summarize the combined effects discussed above and describe other  
24 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
25 also included.

26 The BDCP could result in substantial affects to Sacramento and Antioch Dunes anthicid beetles  
27 because all of the habitat identifiable from aerial photo review falls within either the West Delta  
28 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual  
29 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records  
30 for Sacramento anthicid beetle within the study area fall within areas being considered for  
31 restoration (CM4 and CM5), which represent over half of the extant records for this species range  
32 wide (7 of 13), and the only extant record for Antioch Dunes anthicid beetle, which represent one of  
33 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These  
34 occurrences could be affected by restoration if these areas are chosen as restoration projects.  
35 However, over the term of the BDCP, implementation of conservation components would likely  
36 benefit Sacramento and Antioch Dunes anthicid beetles. Alternative 1B conservation measures CM5,  
37 CM6, and CM7, would generally contribute to the formation of sandbar habitat in the Plan Area.  
38 These measures would improve shoreline conditions by creating benches along levees (CM6),  
39 creating shallow margin and floodplain habitat (CM5), and increasing shoreline vegetation (CM7),  
40 all of which would likely contribute to the formation of sandbars along Delta river channels where  
41 these measures would be implemented. Increasing the structural diversity of Delta river channel  
42 margins would create areas of slow water that would allow for sand to be deposited and for  
43 sandbars to subsequently form. Other factors relevant to effects on Sacramento and Antioch Dunes  
44 anthicid beetles are listed below.

- 45 ● The actual extent of suitable and occupied habitat for these species in the plan is unknown.

- 1     • The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would  
2       likely not be directly impacted where floodplain restoration occurs because the physical  
3       disturbance would be to adjacent levees and agricultural areas. Though these actions would  
4       change hydrologic conditions that could overtime remove the existing sandbars, the expanded  
5       floodplain would create conditions suitable for the formation of new and possibly larger  
6       sandbars.
- 7     • Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat  
8       within these areas would be affected at once. Furthermore, as floodplain restoration is being  
9       implemented new sandbar habitat would likely be forming prior and/or concurrent with future  
10      floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or  
11      Paradise Cut.

12     **NEPA Effects:** In the absence of other conservation actions, the potential effects on Sacramento and  
13     Antioch Dunes anthicid beetles associated with Alternative 1B would represent an adverse effect as  
14     a result of habitat modification of a special-status species and potential for direct mortality.  
15     However, with implementation of restoration associated with CM5, CM6, and CM7, which would be  
16     phased throughout the construction phase, the effects of Alternative 1B as a whole on Sacramento  
17     and Antioch Dunes anthicid beetles would not be adverse under NEPA.

18     **CEQA Conclusion:** Alternative 1B would impact Sacramento and Antioch Dunes anthicid beetles  
19     habitat and could potentially impact seven occurrences of Sacramento anthicid beetle and one  
20     occurrence of Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation  
21     of conservation components would likely benefit Sacramento and Antioch Dunes anthicid beetles.  
22     BDCP conservation components, particularly conservation measures CM5, CM6, and CM7, would  
23     generally contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration  
24     (CM5) would be phased over a period of 30 years so that not all sandbar habitat within these areas  
25     would be affected at once. Furthermore, as floodplain restoration is being implemented new  
26     sandbar habitat would likely be forming prior and/or concurrent with future floodplain restoration  
27     projects that may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

28     Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration  
29     (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the  
30     Delta and be phased throughout the time period when the impacts would be occurring, the  
31     implementation of Alternative 1B as a whole would not result in a substantial adverse effect though  
32     habitat modification and would not substantially reduce the number or restrict the range of these  
33     species. Therefore, the alternative would have a less-than significant impact on Sacramento and  
34     Antioch Dunes anthicid beetles.

### 35     **Delta Green Ground Beetle**

36     Suitable habitat in the study area would be vernal pool complexes and annual grasslands in the  
37     general Jepson Prairie area. The construction, and operations and maintenance of the water  
38     conveyance facilities under Alternative 1B would not affect delta green ground beetle because the  
39     facilities and construction area are outside the known range of the species. Implementation of  
40     Alternative 1B could potentially affect delta green ground beetle through the protection of  
41     grasslands and vernal pool complex (CM3) in the vicinity of Jepson Prairie and the subsequent  
42     implementation of habitat enhancement and management actions and recreational trail  
43     construction (CM11) in these areas. In addition, tidal natural communities restoration (CM4) could  
44     result in potential impacts on delta green ground beetle and its habitat. Full implementation of

Alternative 1B would likely result in beneficial effects on delta green ground beetle through the following conservation actions.

- Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with CM3).
- Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2, associated with CM9).

These areas could contain currently occupied habitat for delta green ground beetle and/or create conditions suitable for eventual range expansion. As explained below, potential impacts on delta green ground beetle would be adverse for NEPA purposes and would be significant for CEQA purposes. Mitigation Measure BIO-42 would reduce the effects under NEPA and reduce the impacts to a less-than-significant level under CEQA.

**Table 12-1B-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		0	0	0	0	<b>NA</b>	<b>NA</b>
CM2-CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		0	0	0	0	0	0
<b>TOTAL IMPACTS</b>		0	0	0	0	0	0

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground Beetle**

Alternative 1B conservation measures could result in the conversion of habitat for and direct mortality of delta green ground beetle. Conservation measure that could affect delta green ground beetle are tidal natural communities habitat restoration (CM4) and habitat enhancement and management activities (CM11) in CZ 1. CZ 1 is the only portion of the Plan Area that contains occupied and potential habitat for delta green ground beetle. The range of the delta green ground

1 beetle is currently believed to be generally bound by Travis Air Force Base to the west, Highway 113  
2 to the east, Hay Road to the north, and Creed Road to the south (Arnold and Kavanaugh 2007; U.S.  
3 Fish and Wildlife Service 2009a). Further discussion of this potential effect is provided below, and  
4 NEPA and CEQA conclusions follow.

- 5 • *CM4 Tidal Natural Communities Restoration*: Tidal restoration in the Cache Slough ROA could  
6 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to  
7 be or potentially occupied by the species. CM4 identifies at least 5,000 acres of freshwater tidal  
8 natural communities restoration in the Cache Slough ROA and Lindsey Slough and Calhoun Cut  
9 have been identified as areas suitable for restoration. Lindsey Slough is just east of Jepson  
10 Prairie, and Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general  
11 Jepson Prairie area and is adjacent to areas of potential habitat for delta green ground beetle.  
12 The tidal restoration methods and techniques identified in CM4 (see BDCP Chapter 3, Section  
13 3.4.4.3.3) includes excavating channels; modifying ditches, cuts, and levees to encourage tidal  
14 circulation; and scalping higher elevation areas to create marsh plains. These disturbances could  
15 affect delta green ground beetle through habitat modification, either directly or indirectly  
16 through hydrologic modifications, and/or result in direct mortality to the species. No CNDDDB  
17 records for delta green ground beetle are intersected by the hypothetical tidal restoration  
18 footprints being used by the BDCP.
- 19 • *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*  
20 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in  
21 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres  
22 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include  
23 direct mortality to larvae and adults from the implementation of grassland management  
24 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to  
25 these grassland and vernal pool complex management actions, CM11 also includes guidelines  
26 and techniques for invasive plant control, which may include manual control (hand-pulling and  
27 digging), mechanical control (large equipment), and chemical control, though some of these  
28 methods would be restricted in areas where rare plants occur or in critical habitat for vernal  
29 pool species. The creation of new recreation trails as part of CM11 would result in impacts on  
30 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

31 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600  
32 acres of vernal pool complex and up 10 wetted acres of vernal pool complex restoration, some of  
33 which could occur in CZ 1 (CM3 and CM9), could benefit delta green ground beetle if these areas  
34 occur within the range of the species. The management of these grasslands and vernal pool  
35 complexes according to *CM11 Natural Communities Enhancement and Management* and the  
36 construction of recreational trails in CZ 1 has a potential to affect this species. *AMM37 Recreation*  
37 would ensure that new trails in vernal pool complexes are sited at least 250 feet from wetland  
38 features, or closer if site-specific information indicates that local watershed surrounding a vernal  
39 pools would not be adversely affected. Direct mortality and/or the affects on delta green ground  
40 beetle habitat would be an adverse effect under NEPA. Mitigation Measure BIO-42, *Avoid Impacts on*  
41 *Delta Green Ground Beetle and its Habitat*, would be available to reduce this effect.

42 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal  
43 natural communities restoration (CM4), vernal pool restoration (CM9), recreational trail  
44 construction, and subsequent enhancement and management actions (CM11) could potentially  
45 impact delta green ground beetle. Tidal restoration projects around Calhoun Cut and possibly

1 Lindsey Slough could affect habitat and result in direct mortality of the species from excavating  
2 channels; modifying ditches, cuts, and levees to encourage tidal circulation; and scalping higher  
3 elevation areas to create marsh plains. Potential impacts from CM11 could include direct mortality  
4 of larvae and adults resulting from the implementation of recreation trail construction in 15.5 acres  
5 of grassland in CZ 1 and from grassland management techniques, which may include livestock  
6 grazing, prescribed burning, and mowing. AMM37 would ensure that new trails in vernal pool  
7 complexes are sited at least 250 feet from wetland features, or closer if site-specific information  
8 indicates that local watershed surrounding a vernal pools is not adversely affected. CM11 also  
9 includes guidelines and techniques for invasive plant control, which may include manual control  
10 (hand-pulling and digging), mechanical control (large equipment), and chemical control, though  
11 some of these methods would be restricted in areas where rare plants occur and in critical habitat  
12 for vernal pool species. These actions could result in adverse effects through habitat modification  
13 and a possible reduction in the number of the species or restrict its range, and, therefore, could  
14 result in significant impacts on delta green ground beetle. Implementation of Mitigation Measure  
15 BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*, would reduce these potential  
16 impacts to a less-than-significant level.

17 **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

18 As part of the design of recreational trails in CZ 1, the development of tidal restoration plans and  
19 site-specific management plans on protected grasslands and vernal pool complexes, and the  
20 possible implementation of vernal pool restoration in the area of Jepson Prairie, BDCP  
21 proponents will implement the following measures to avoid effects on delta green ground  
22 beetle.

- 23 • If recreational trail construction, or habitat restoration or protection is planned for the lands  
24 adjacent to Calhoun Cut and noncultivated lands on the western side of Lindsey Slough,  
25 these area will be evaluated by a USFWS approved biologist for potential delta green ground  
26 beetle habitat (large playa pools, or other similar aquatic features, with low growing  
27 vegetation or bare soils around the perimeter). The biologist will have previous experience  
28 with identifying suitable habitat requirements for delta green ground beetle.
- 29 • Any suitable habitat identified by the biologist (with previous experience with delta green  
30 ground beetle) within the species current range will be considered potentially occupied and  
31 all ground disturbing covered activities in these areas will be avoided, which for the Plan  
32 Area is generally the area west of State Route 113.
- 33 • Any other areas identified as suitable habitat outside of the current range of the species will  
34 be surveyed by a biologist with previous experience in surveying for and identifying delta  
35 green ground beetle. No ground disturbing covered activities will occur in areas identified as  
36 occupied by delta green ground beetle.
- 37 • Based on the results of the habitat evaluations and surveys, recreational trail construction  
38 plans, and site-specific restoration and management plans will be developed so that they  
39 don't conflict with the recovery goals for delta green ground beetle in the USFWS's 2005  
40 Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and  
41 Wildlife Service 2005). Plans will include measures to protect and manage for delta green  
42 ground beetle so that they continue to support existing populations or allow for future  
43 colonization.

1 **Callippe Silverspot Butterfly**

2 Suitable habitats for callippe silverspot butterfly are typically in areas influenced by coastal fog with  
3 hilltops that support the specie's host-plant, Johnny jump-ups. Preferred nectar flowers used by  
4 adults include thistles, blessed milk thistle, and coyote wild mint. Other native nectar sources  
5 include hairy false goldenaster, coast buckwheat, mourning bride, and California buckeye. The  
6 construction, and operations and maintenance of the water conveyance facilities under Alternative  
7 1B would not result in impacts on callippe silverspot butterfly or its habitat. If Cordelia Hills and  
8 Potrero Hills are identified for grassland protection opportunities as part of *CM3 Natural*  
9 *Communities Protection and Restoration*, the subsequent implementation of *CM11 Natural*  
10 *Communities Enhancement and Management* could potentially affect callippe silverspot butterfly.  
11 Callippe silverspot butterfly has been documented in the western most portion of the Plan Area (CZ  
12 11) in the Cordelia Hills (Solano County Water Agency 2009). Potential habitat for the species  
13 (grassy hills with *Viola pedunculata*) is present in the Potrero Hills, but it has not been observed  
14 there (EDAW 2005, California Department of Fish and Wildlife 2013). Though CZ 11 has been  
15 identified as potential area for grassland restoration in *CM8 Grassland Natural Community*  
16 *Restoration*, the primary goal there is to restore small patches of grassland to connect to Jepson  
17 Prairie and/or the restoration of upland grasses adjacent to tidal brackish emergent wetland in  
18 Suisun Marsh, both of which would not be areas suitable for callippe silverspot butterfly. The full  
19 implementation of Alternative 1B would protect up to 2,000 acres of grassland in CZ 11 (Objective  
20 GNC1.1, associated with CM3), some of which may contain habitat for callippe silverspot butterfly.  
21 As explained below, potential impacts on callippe silverspot would be adverse for NEPA purposes  
22 and would be significant for CEQA purposes. Mitigation Measure BIO-43, *Avoid and Minimize Loss of*  
23 *Callippe Silverspot Butterfly Habitat*, would reduce the effects under NEPA and reduce the impacts to  
24 a less-than-significant level under CEQA.

1 **Table 12-1B-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 1B**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**  
5 **Butterfly**

6 Alternative 1B conservation measures could result in the conversion of habitat and/or direct  
7 mortality to Callippe silverspot butterfly. Only one conservation measure was identified as  
8 potentially affecting callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*  
9 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such  
10 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*  
11 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA  
12 conclusions follow.

13 *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*  
14 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in CZ  
15 11. If areas chosen for protection include Cordelia Hills or Potrero Hills, where there is known and  
16 potential habitat, respectively, then grassland enhancement and management actions could affect  
17 the callippe silverspot butterfly. Potential effects from CM11 could include the loss of larval host and  
18 nectar sources and direct mortality to larvae and adults from the installation of artificial nesting  
19 burrows and structures and the implementation of grassland management techniques, which may  
20 include livestock grazing, prescribed burning, and mowing. In addition to these grassland  
21 management actions, CM11 also includes guidelines and techniques for invasive plant control, which  
22 may include manual control (hand-pulling and digging), mechanical control (large equipment), and  
23 chemical control. Several of the preferred nectar sources are thistles, some of which have been

1 identified by the California Invasive Plant Council as having limited to moderate ecological impacts  
2 (California Invasive Plant Council 2006).

3 **NEPA Effects:** The protection of 2,000 acres of grassland within CZ 11 could benefit callippe  
4 silverspot butterfly if these protected areas include occupied and potential habitat on the hill tops in  
5 Cordelia Hills and Potrero Hills. The management of these grasslands according to CM11 has  
6 potential to adversely affect this species. Direct mortality and/or the removal of larval host plants  
7 and nectar sources for adults would be an adverse effect under NEPA. Implementation of Mitigation  
8 Measure BIO-43, *Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat*, would ensure the  
9 effect is not adverse.

10 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of  
11 *CM3 Natural Communities Protection and Restoration*, then the subsequent management of these  
12 grasslands according to *CM11 Natural Communities Enhancement and Management* has the potential  
13 to affect this species. Potential impacts from CM11 could include the loss of larval host and nectar  
14 sources and direct mortality of larvae and adults resulting from the installation of artificial nesting  
15 burrows and structures and the implementation of grassland management techniques, which may  
16 include livestock grazing, prescribed burning, and mowing. In addition to these grassland  
17 management actions, CM11 also includes guidelines and techniques for invasive plant control that  
18 may include manual control (hand-pulling and digging), mechanical control (large equipment), and  
19 chemical control, which could result in direct and indirect effects on larval host plants and nectar  
20 plants. These actions could result in adverse effects through habitat modification and a possible  
21 reduction in the number of the species or restrict its range and would, therefore, result in a  
22 significant impact on the species. However, over the term of the BDCP, callippe silverspot butterfly  
23 could benefit from the protection of occupied and potential habitat for the species with the  
24 implementation of Mitigation Measure BIO-43, which would avoid and minimize effects from  
25 management actions and reduce the potential impact to a less-than-significant level.

### 26 **Mitigation Measures BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly** 27 **Habitat**

28 As part of the development of site-specific management plans on protected grasslands in the  
29 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to  
30 avoid and minimize the loss of callippe silverspot habitat.

- 31 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host  
32 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These  
33 surveys should occur during the plant's blooming period (typically early January through  
34 April)
- 35 • If larval host plants are present, then presence/absence surveys for callippe silverspot  
36 butterfly larvae will be conducted according to the most recent USFWS approved survey  
37 methods by a biologist with previous experience in surveying for and identifying callippe  
38 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult  
39 flight season, which usually starts in mid-May.
- 40 • If larvae are detected then no further surveys are necessary. If larvae are not detected then  
41 surveys for adults will be conducted by a biologist familiar with surveying for and  
42 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8  
43 to 10 weeks.



- 1           • If callippe silverspot butterflies are detected, then the site-specific management plans will  
2           be written to include measures to protect and manage for larval host plants and nectar  
3           sources so that they continue to support existing populations and/or allow for future  
4           colonization. Mapping of both larval host plants and nectar sources will be incorporated into  
5           the management plans.

6           **California Red-Legged Frog**

7           Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and  
8           grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern  
9           edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide  
10          potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled  
11          habitat, none is expected to be affected by BDCP actions. Construction and restoration associated  
12          with Alternative 1B conservation measures would result in both temporary and permanent losses of  
13          California red-legged frog modeled habitat as indicated in Table 12-1B-20. Factors considered in  
14          assessing the value of affected habitat for the California red-legged frog, to the extent that  
15          information is available, are presence of limiting habitat (aquatic breeding habitat), known  
16          occurrences and clusters of occurrences, proximity of the affected habitat to existing protected  
17          lands, and the overall degraded or fragmented nature of the habitat. The study area represents the  
18          extreme eastern edge of the species' coastal range, and species' occurrences are reported only from  
19          CZ 8 and CZ 11. Full implementation of Alternative 1B would also include the following biological  
20          objectives over the term of the BDCP to benefit the California red-legged frog (BDCP Chapter 3,  
21          *Conservation Strategy*).

- 22          • Increase native species diversity and relative cover of native plant species, and reduce the  
23          introduction and proliferation of nonnative species (Objective L2.6, associated with CM11,  
24          CM13, and CM20).
- 25          • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 26          • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
27          breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
28          CM3)
- 29          • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
30          CM11).
- 31          • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
32          duration and suitable composition of vegetative cover to support breeding for covered  
33          amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

34          As explained below, with the restoration and protection of these amounts of habitat, in addition to  
35          implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA  
36          purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-20. Changes in California Red-Legged Frog Modeled Habitat Associated with**  
2 **Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	1	1	0	0	NA	NA
	Upland	5	5	154	154	NA	NA
<b>Total Impacts CM1</b>		<b>6</b>	<b>6</b>	<b>154</b>	<b>154</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>8</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>14</b>	<b>30</b>	<b>154</b>	<b>154</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**  
5 **Legged Frog**

6 Alternative 1B conservation measures would result in the permanent and temporary loss combined  
7 of up to 1 acre of modeled aquatic habitat and 183 acres of modeled upland habitat for California  
8 red-legged frog (Table 12-1B-20). There are no California red-legged frog occurrences that overlap  
9 with the Plan footprint. Conservation measures that would result in these losses are conveyance  
10 facilities and transmission line construction (CM1) and recreational facility construction for CM11.  
11 Construction activities associated with the water conveyance facilities and recreational facilities,  
12 including operation of construction equipment, could result in temporary effects on, as well as  
13 injury and mortality of, California red-legged frogs. In addition, natural enhancement and  
14 management activities (CM11), which include ground disturbance or removal of nonnative  
15 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
17 facilities could degrade or eliminate California red-legged frog habitat including injury and mortality  
18 of California red-legged frogs. Each of these individual activities is described below. A summary  
19 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual  
20 conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B, including transmission line  
22 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and 5 acres of  
23 upland habitat for California red-legged frog in CZ 8 (Table 12-1B-20). Permanent effects would  
24 be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension and  
25 installation of cross culverts, installation of structural hardscape, and installation and relocation

1 of utilities. Construction-related effects would temporarily disturb 154 acres of upland habitat  
2 for the California red-legged frog (Table 12-1B-20).

- 3 ● *CM11 Natural Communities Enhancement and Management*: Based on the recreation  
4 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an  
5 estimated 24 acres of upland cover and dispersal habitat for the California red-legged frog  
6 would be removed as a result of constructing trails and associated recreational facilities. Passive  
7 recreation in the reserve system could result in trampling and disturbance of egg masses in  
8 water bodies, degradation of water quality through erosion and sedimentation, and trampling of  
9 sites adjacent to upland habitat used for cover and movement. However, *AMM37 Recreation*  
10 requires protection of water bodies from recreational activities and requires trail setbacks from  
11 wetlands. With these restrictions, recreation-related effects on California red-legged frog are  
12 expected to be minimal.

13 Activities associated with natural communities enhancement and management in protected  
14 California red-legged frog habitat, such as ground disturbance or herbicide use to control  
15 nonnative vegetation, could result in local adverse habitat effects on, and injury or mortality of,  
16 California red-legged frogs. These effects would be avoided and minimized with implementation  
17 of the AMMs listed below. Herbicides would only be used in California red-legged frog habitat in  
18 accordance with the written recommendation of a licensed, registered pest control advisor and  
19 in conformance with label precautions and federal, state, and local regulations in a manner that  
20 avoids or minimizes harm to the California red-legged frog.

- 21 ● *Critical habitat*: Several conservation measures would be implemented in California red-legged  
22 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of  
23 designated critical habitat for the California red-legged frog overlaps with the study area along  
24 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated  
25 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.  
26 Conservation actions to protect and enhance grassland habitat for covered species, including  
27 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated  
28 critical habitat for the California red-legged frog and California tiger salamander. Any habitat  
29 enhancement actions for these species in designated critical habitat are expected to enhance the  
30 value of any affected designated critical habitat for conservation of California red-legged frog.  
31 These actions would result in an overall benefit to California red-legged frog within the study  
32 area through protection and management of grasslands with associated intermittent stream  
33 habitat and through restoration of vernal pool complex habitat and its associated grassland  
34 habitat.
- 35 ● *Operations and maintenance*: Ongoing water conveyance facilities operation and maintenance is  
36 expected to have little if any adverse effect on the California red-legged frog. Postconstruction  
37 operation and maintenance of the above-ground water conveyance facilities could result in  
38 ongoing but periodic postconstruction disturbances that could affect California red-legged frog  
39 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use  
40 along transmission corridors in CZ 8, could also result in injury or mortality of California red-  
41 legged frogs if present in work sites. Implementation conservation actions described below and  
42 AMM1–AMM6, AMM10, AMM14, and AMM37 would reduce these effects.
- 43 ● *Injury and direct mortality*: Construction activities associated with the water conveyance  
44 facilities, vernal pool complex restoration, and habitat and management enhancement-related  
45 activities, including operation of construction equipment, could result in injury or mortality of

1 California red-legged frogs. Breeding, foraging, dispersal, and overwintering behavior may be  
2 altered during construction activities, resulting in injury or mortality of California red-legged  
3 frog. Frogs occupying burrows could be trapped and crushed during ground-disturbing  
4 activities. Degradation and loss of estivation habitat is also anticipated to result from the  
5 removal of vegetative cover and collapsing of burrows. Injury or mortality would be avoided and  
6 minimized through implementation of seasonal constraints and preconstruction surveys in  
7 suitable habitat, collapsing unoccupied burrows, and relocating frogs outside of the construction  
8 area as described in AMM1–AMM6, AMM10, AMM14, and AMM37.

9 The following paragraphs summarize the combined effects discussed above and describe other  
10 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
11 also included.

### 12 ***Near-Term Timeframe***

13 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the  
14 near-term BDCP conservation strategy has been evaluated to determine whether it would provide  
15 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
16 conveyance facilities construction would not be adverse under NEPA.

17 Alternative 1B would permanently remove approximately 1 acre of aquatic habitat and 167 acres of  
18 upland terrestrial cover habitat for California red-legged frog. The effects would result from  
19 construction of the water conveyance facilities (CM11, 60 acres) and recreational facilities (CM11, 8  
20 acres).

21 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
22 and that are identified in the biological goals and objectives for California's red-legged frog in  
23 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and  
24 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic  
25 habitat should be restored, 1 acre of aquatic habitat should be protected, and 334 acres of grassland  
26 should be protected for California red-legged frog to mitigate the near-term losses.

27 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area  
28 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron  
29 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan  
30 Area with the highest long-term conservation value for the species based on known species  
31 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective  
32 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide  
33 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation  
34 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic  
35 features in grasslands would be maintained and enhanced to provide suitable inundation depth and  
36 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

37 These conservation actions would occur in the same timeframe as the construction losses, thereby  
38 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
39 represent performance standards for considering the effectiveness of CM3 protection and  
40 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
41 and the additional detail in the biological objectives for California red-legged frog satisfy the typical  
42 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
43 term effects of the other conservation measures.

1 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM14 California Red-*  
6 *Legged Frog, and AMM37 Recreation.* These AMMs include elements that avoid or minimize the risk  
7 of affecting habitats and species adjacent to work areas and storage sites. The AMMs are described  
8 in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures.*

### 9 **Late Long-Term Timeframe**

10 The habitat model indicates that the study area supports approximately 159 acres of aquatic and  
11 7,766 acres of upland habitat for California red-legged frog. Alternative 1B as a whole would result  
12 in the permanent loss of and temporary effects on 1 acre of aquatic habitat and 183 acres of upland  
13 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic  
14 habitat in the study area and 2% of the total upland habitat in the study area). The 1 acre of aquatic  
15 habitat that would be permanently lost is not known to be used for breeding. Most of the California  
16 red-legged frog upland habitat that would be removed consists of naturalized grassland or  
17 cultivated land in a highly disturbed or modified setting on lands immediately adjacent to Clifton  
18 Court Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of  
19 known California red-legged frog occurrences to the west. However, this habitat consists mostly of  
20 cultivated lands and small patches of grasslands, and past and current surveys in this area have not  
21 found any evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta*  
22 *Conservation Plan EIR/EIS Environmental Data Report*).

23 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
24 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
25 benefit the California red-legged frog by providing habitat in the portion of the study area with the  
26 highest long-term conservation value for the species based on known species occurrences and large,  
27 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
28 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
29 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
30 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
31 depth and duration and suitable composition of vegetative cover to support breeding California red-  
32 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other  
33 measures would be implemented as described in CM11 to promote growth of aquatic vegetation  
34 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in  
35 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the  
36 extensive Los Vaqueros watershed lands, including grassland areas supporting this species. This  
37 objective would ensure that California red-legged frog upland and associated aquatic habitats would  
38 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within  
39 and adjacent to the Plan Area.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
41 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
42 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool  
43 complex that could overlap with the species model, would result in the restoration of 16 acres of  
44 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,  
45 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could

1 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047  
2 acres of upland California red-legged frog modeled habitat.

3 **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 1B  
4 would be not be adverse because the BDCP has committed to protecting and restoring the acreage  
5 required to meet the typical mitigation ratios described above. In the late long-term, the losses of  
6 California red-legged frog aquatic and upland habitat associated with Alternative 1B, in the absence  
7 of other conservation actions, would represent an adverse effect as a result of habitat modification  
8 and potential direct mortality of a special-status species. However, with habitat protection and  
9 restoration associated with the conservation components, guided by landscape-scale goals and  
10 objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 1B as a  
11 whole on California red-legged frog would not be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facility construction is being evaluated at the project level, the near-  
15 term BDCP conservation strategy has been evaluated to determine whether it would provide  
16 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impact of  
17 conveyance facilities construction would be less than significant under CEQA.

18 Alternative 1B would permanently remove approximately 1 acre of aquatic habitat and 167 acres of  
19 upland terrestrial cover habitat for California red-legged frog. The effects would result from  
20 construction of the water conveyance facilities (CM1160 acres) and recreational facilities (CM11, 8  
21 acres).

22 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
23 and that are identified in the biological goals and objectives for California’s red-legged frog in  
24 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and  
25 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic  
26 habitat should be restored, 1 acre of aquatic habitat should be protected, and 334 acres of grassland  
27 should be protected for California red-legged frog to mitigate the near-term losses.

28 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area  
29 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron  
30 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan  
31 Area with the highest long-term conservation value for the species based on known species  
32 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective  
33 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide  
34 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation  
35 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic  
36 features in grasslands would be maintained and enhanced to provide suitable inundation depth and  
37 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

38 These conservation actions would occur in the same timeframe as the construction losses, thereby  
39 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
40 represent performance standards for considering the effectiveness of CM3 protection and  
41 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
42 and the additional detail in the biological objectives for California red-legged frog satisfy the typical

1 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
2 term effects of the other conservation measures.

3 The BDCP also contains commitments to implement AMM1-AMM6, AMM10, AMM14, and AMM37.  
4 These AMMs include elements that avoid or minimize the risk of affecting individuals and species  
5 habitats adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
6 Appendix 3.C, *Avoidance and Minimization Measures*. These commitments are more than sufficient to  
7 support the conclusion that the near-term effects of Alternative 1B on California red-legged frog  
8 would be less than significant, because the number of acres required to meet the typical ratios  
9 described above would be only 1 acre of aquatic habitat restored, 1 acre of aquatic habitat protected,  
10 and 183 acres of upland communities protected.

### 11 **Late Long-Term Timeframe**

12 The habitat model indicates that the study area supports approximately 159 acres of aquatic and  
13 7,766 acres of upland habitat for California red-legged frog. Alternative 1B as a whole would result  
14 in the permanent loss of and temporary effects on 1 acre of aquatic habitat and 183 acres of upland  
15 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic  
16 habitat in the study area and 2% of the total upland habitat in the study area). The 1 acre of aquatic  
17 habitat that would be permanently lost is not known to be used for breeding. Most of the California  
18 red-legged frog upland habitat that would be removed consists of naturalized grassland or cultivated  
19 land in a highly disturbed or modified setting on lands immediately adjacent to Clifton Court Forebay.  
20 The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known California  
21 red-legged frog occurrences to the west. However, this habitat consists mostly of cultivated lands  
22 and small patches of grasslands, and past and current surveys in this area have not found any  
23 evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*  
24 *EIR/EIS Environmental Data Report*).

25 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
26 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
27 benefit the California red-legged frog by providing habitat in the portion of the study area with the  
28 highest long-term conservation value for the species based on known species occurrences and large,  
29 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
30 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
31 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
32 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
33 depth and duration and suitable composition of vegetative cover to support breeding California red-  
34 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other  
35 measures would be implemented as described in CM11 to promote growth of aquatic vegetation  
36 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in  
37 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the  
38 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This  
39 objective would ensure that California red-legged frog upland and associated aquatic habitats would  
40 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within  
41 and adjacent to the Plan Area.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
43 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
44 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool

1 complex that could overlap with the species model, would result in the restoration of 16 acres of  
2 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,  
3 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could  
4 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047  
5 acres of upland California red-legged frog modeled habitat.

6 In the absence of other conservation actions, the losses of California red-legged frog aquatic and  
7 upland habitat associated with Alternative 1B would represent an adverse effect as a result of  
8 habitat modification and potential direct mortality of a special-status species. However, with habitat  
9 protection and restoration associated with the conservation components, guided by landscape-scale  
10 goals and objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative  
11 1B would be less than significant.

#### 12 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

13 Noise and visual disturbance outside the project footprint but within 500 feet of construction  
14 activities are indirect effects that could temporarily affect the use of California red-legged frog  
15 habitat, all of which is upland cover and dispersal habitat. The areas to be affected are near Clifton  
16 Court Forebay, and no California red-legged frogs were detected during recent surveys conducted in  
17 this area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*  
18 *Report*).

19 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
20 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
21 of California red-legged frog habitat downstream of the construction area by filling in pools and  
22 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California  
23 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants  
24 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
25 quality and California red-legged frog.

26 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM14, and AMM37 as part of  
27 implementing Alternative 1B would avoid the potential for substantial adverse effects on California  
28 red-legged frogs, either indirectly or through habitat modifications. These AMMs would also avoid  
29 and minimize effects that could substantially reduce the number of California red-legged frogs, or  
30 restrict the species' range. Therefore, the indirect effects of Alternative 1B would not have an  
31 adverse effect on California red-legged frog.

32 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well  
33 as construction-related noise and visual disturbances, could impact California red-legged frog in  
34 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
35 accidental release of petroleum or other contaminants that could impact California red-legged frog  
36 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California red-  
37 legged frog habitat could also have a negative impact on the species or its prey. With  
38 implementation of AMM1–AMM6, AMM10, AMM14, and AMM37, construction, operation, and  
39 maintenance under Alternative 1B would avoid the potential for substantial adverse effects on  
40 California red-legged frog, either indirectly or through habitat modifications, and would not result in  
41 a substantial reduction in numbers or a restriction in the range of California red-legged frogs. The  
42 indirect effects of BDCP Alternative 1B would have a less-than-significant impact on California red-  
43 legged frogs.



## 1 California Tiger Salamander

2 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial  
3 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,  
4 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all  
5 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a  
6 geographic area defined by species records and areas most likely to support the species. Patches of  
7 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands  
8 outside of the study area boundary were included. Modeled aquatic breeding habitat for the  
9 California tiger salamander includes vernal pools and seasonal and perennial ponds.

10 Factors considered in assessing the value of affected habitat for California tiger salamander, to the  
11 extent that information is available, include presence of limiting habitat (aquatic breeding habitat),  
12 known occurrences and clusters of occurrences, proximity of the affected habitat to existing  
13 protected lands, and the overall degraded or fragmented nature of the habitat. While conservation  
14 measures implemented in other CZs could have potential effects on California tiger salamander,  
15 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their  
16 closer proximity to known occurrences of the species.

17 Alternative 1B is expected to result in the temporary, permanent, and periodic removal of upland  
18 habitat that California tiger salamander uses for cover and dispersal (Table 12-1B-21). Potential  
19 aquatic habitat for this species would not be affected. While stock ponds are underrepresented as a  
20 modeled habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative  
21 1B would also include the following biological objectives over the term of the BDCP to benefit the  
22 California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 23 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
24 between existing conservation lands (Objective L1.6, associated with CM3).
- 25 ● Increase native species diversity and relative cover of native plant species, and reduce the  
26 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 27 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
28 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
29 associated with CM3, CM8, and CM11).
- 30 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
31 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 32 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
33 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 34 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
35 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
36 ASWNC2.3, associated with CM11).
- 37 ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and CZ 11, primarily in core  
38 vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of  
39 California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
40 associated with CM3).
- 41 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool acreage  
42 (up to 67 acres of vernal pool complex restoration, assuming that all anticipated impacts [10

- 1 wetted acres] occur and that the restored vernal pool complex has 15% density of vernal pools)  
2 (Objective VPNC1.2, associated with CM3 and CM9).
- 3 • Increase the size and connectivity of protected vernal pool complex within the Plan Area and  
4 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective  
5 VPNC1.3, associated with CM3).
  - 6 • Protect the range of inundation characteristics that are currently represented by vernal pools  
7 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
  - 8 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
  - 9 • Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
10 GNC1.2, associated with CM3 and CM8).
  - 11 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
12 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
13 CM3).
  - 14 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
15 CM11).
  - 16 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
17 duration and suitable composition of vegetative cover to support breeding for covered  
18 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
20 implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA  
21 purposes and would be less than significant for CEQA purposes.

22 **Table 12-1B-21. Changes in California Tiger Salamander Modeled Habitat Associated with**  
23 **Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	13	13	154	154	NA	NA
<b>Total Impacts CM1</b>		<b>13</b>	<b>13</b>	<b>154</b>	<b>154</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191-639	0
<b>Total Impacts CM2-CM18</b>		<b>292</b>	<b>634</b>	<b>0</b>	<b>0</b>	<b>191-639</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>305</b>	<b>647</b>	<b>154</b>	<b>154</b>	<b>191-639</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**  
2 **Salamander**

3 Alternative 1B conservation measures would result in the permanent and temporary loss combined  
4 of up to 801 acres of modeled upland habitat for California tiger salamander (Table 12-1B-21).  
5 There are no California tiger salamander occurrences that overlap with the Plan footprint.  
6 Conservation measures that would result in these losses are conveyance facilities and transmission  
7 line construction, and establishment and use of RTM, borrow, and spoils areas (CM1), Fremont  
8 Weir/Yolo Bypass improvements (CM2), tidal natural community restoration (CM4), construction of  
9 recreational facilities (CM11), and construction of a conservation fish hatchery (CM18). Habitat  
10 enhancement and management activities (CM11), which include ground disturbance or removal of  
11 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
12 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
13 facilities could degrade or eliminate California tiger salamander habitat. Each of these individual  
14 activities is described below. A summary statement of the combined impacts and a NEPA effects and  
15 a CEQA conclusion follows the individual conservation measure discussions.

- 16 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities,  
17 including transmission lines, would result in the permanent loss of 13 acres of upland habitat  
18 for California tiger salamander habitat, primarily in CZ 8 (Table 12-1B-21). Permanent effects  
19 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension  
20 and installation of cross culverts, installation of structural hardscape, and installation and  
21 relocation of utilities. Construction-related effects would temporarily disturb 154 acres of  
22 upland habitat for the California tiger salamander (Table 12-1B-21). The area that would be  
23 affected by conveyance facilities construction is south of Clifton Court Forebay, where modeled  
24 California tiger salamander habitat is of relatively low value in that it consists of fragmented  
25 patches of primarily terrestrial habitat surrounded by actively cultivated lands. The highest  
26 concentration of California tiger salamander occurrences are in CZ 8 and west of the conveyance  
27 facilities alignment, while lands to the east consist primarily of actively cultivated lands that are  
28 not suitable for the species. Habitat loss in this area is not expected to contribute to habitat  
29 fragmentation or impede important California tiger salamander dispersal.
- 30 ● *CM2 Yolo Bypass Fisheries Enhancement:* Improvements in the Yolo Bypass would result in the  
31 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the  
32 California tiger salamander in the late-longterm. The modeled habitat in the Yolo Bypass is of  
33 low potential for California tiger salamander: There have been no observations of California  
34 tiger salamander in this area based on the results of a number of surveys for vernal pool  
35 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or  
36 large grassland areas with stock ponds and similar aquatic features that hold water long enough  
37 to provide potential breeding habitat for this species.
- 38 ● *CM4 Tidal Natural Communities Restoration:* This activity would result in the permanent  
39 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area  
40 in the late longterm. Tidal restoration in the Cache Slough area would result in habitat loss along  
41 the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the eastern  
42 edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the  
43 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool  
44 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson  
45 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and  
46 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species, however, the

1 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded  
2 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the  
3 northeastern edge of the Jepson Prairie block of habitat and would not contribute to  
4 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based  
5 on projections of where restoration may occur, actual effects are expected to be lower because  
6 of the ability to select sites that minimize effects on California tiger salamander.

- 7 ● *CM11 Natural Communities Enhancement and Management*: Based on the recreation  
8 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an  
9 estimated 40 acres of terrestrial cover and aestivation habitat for the California tiger  
10 salamander would be removed as a result of constructing trails and associated recreational  
11 facilities. Passive recreation in the reserve system could result in trampling and disturbance of  
12 eggs and larvae in water bodies, degradation of water quality through erosion and  
13 sedimentation, and trampling of sites adjacent to upland habitat used for cover and movement.  
14 However, AMM37 requires protection of water bodies from recreational activities and requires  
15 trail setbacks from wetlands. With these restrictions, recreation related effects on California  
16 tiger salamander are expected to be minimal.

17 Habitat enhancement- and management-related activities in protected California tiger  
18 salamander habitats would result in overall improvements to and maintenance of California  
19 tiger salamander habitat values over the term of the BDCP. Activities associated with natural  
20 communities enhancement and management over the term of the BDCP in protected California  
21 tiger salamander habitat, such as ground disturbance or herbicide use to control nonnative  
22 vegetation, could result in local adverse habitat effects and injury or mortality of California tiger  
23 salamander and disturbance effects if individuals are present in work sites. Implementation of  
24 AMM1–AMM6, AMM10, AMM13, and AMM37 would reduce these effects. Herbicides would only  
25 be used in California tiger salamander habitat in accordance with the written recommendation  
26 of a licensed, registered Pest Control Advisor and in conformance with label precautions and  
27 federal, state, and local regulations in a manner that avoids or minimizes harm to the California  
28 tiger salamander.

- 29 ● *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of  
30 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger  
31 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have  
32 not been developed, although the facility is expected to be constructed near Rio Vista on  
33 cultivated lands in low-value habitat for the species
- 34 ● *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie  
35 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located  
36 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat  
37 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with  
38 some restoration taking place along the Barker and Lindsey Slough channels west to  
39 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough  
40 Channel west of SR 113 into Critical Habitat Unit 2.
- 41 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
42 little if any adverse effect on the California tiger salamander. Postconstruction operation and  
43 maintenance of the above-ground water conveyance facilities could result in ongoing but  
44 periodic disturbances that could affect California tiger salamander use of the surrounding  
45 habitat. Operation of maintenance equipment, including vehicle use along transmission

1 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if  
2 present in work sites. These effects, however, would be minimized with implementation of the  
3 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and  
4 AMM37.

- 5 • Injury and direct mortality: Construction activities associated with the water conveyance  
6 facilities, vernal pool complex restoration, and habitat and management enhancement-related  
7 activities, including operation of construction equipment, could result in injury or mortality of  
8 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered  
9 during construction activities, resulting in injury or mortality of California tiger salamander if  
10 the species is present. Salamanders occupying burrows could be trapped and crushed during  
11 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to  
12 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would  
13 be avoided and minimized through implementation of seasonal constraints and preconstruction  
14 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside  
15 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

16 The following paragraphs summarize the combined effects discussed above and describe other  
17 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are  
18 also included.

#### 19 ***Near-Term Timeframe***

20 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
21 term BDCP conservation strategy has been evaluated to determine whether it would provide  
22 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
23 construction effects would not be adverse under NEPA.

24 Alternative 1B would permanently remove approximately 459 acres of upland terrestrial cover  
25 habitat for California tiger salamander. The effects would result from construction of the water  
26 conveyance facilities (CM1, 167 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat  
27 restoration (CM4, 203 acres), and construction of recreational facilities (CM11, 12 acres), and  
28 construction of conservation hatcheries (CM18, 35 acres).

29 Typical NEPA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate  
30 that 918 acres of grassland should be protected in the near-term for California tiger salamander to  
31 mitigate the near-term losses.

32 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
33 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic  
34 habitat (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective  
35 GNC1.1). The landscape-scale goals and objectives would inform the near-term protection and  
36 restoration efforts. The natural community restoration and protection activities are expected to be  
37 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
38 occurrence of impacts to constitute adequate mitigation for NEPA purposes.

39 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM13 California Tiger*

1 *Salamander*, and *AMM37 Recreation*. These AMMs include elements that avoid or minimize the risk  
2 of affecting habitats and species adjacent to work areas and storage sites. The AMMs are described  
3 in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 4 ***Late Long-Term Timeframe***

5 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
6 29,459 acres of upland habitat for California tiger salamander. Alternative 1B as a whole would  
7 result in the permanent loss of and temporary effects on 801 acres of upland habitat for California  
8 tiger salamander for the term of the plan (less than 3% of the total upland habitat in the study area).  
9 The location of these losses is described above in the discussions of CM1, CM2, CM4, CM11, and  
10 CM18.

11 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
12 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
13 benefit the California tiger salamander by providing habitat in the portion of the study area with the  
14 highest long-term conservation value for the species based on known species occurrences and large,  
15 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
16 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
17 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
18 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
19 depth and duration and suitable composition of vegetative cover to support breeding California tiger  
20 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and  
21 other measures would be implemented as described in CM11 to promote growth of aquatic  
22 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands  
23 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*  
24 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.  
25 This objective would ensure that California tiger salamander upland and associated aquatic habitats  
26 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat  
27 within and adjacent to the study area.

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
29 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
30 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could  
31 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres  
32 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal  
33 wetland complex, vernal pool complex, and grassland that could overlap with the species model,  
34 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger  
35 salamander modeled habitat.

36 ***NEPA Effects:*** In the near-term, the loss of California tiger salamander habitat under Alternative 1B  
37 would be not be adverse because the BDCP has committed to protecting the acreage required to  
38 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger  
39 salamander upland habitat associated with Alternative 1B, in the absence of other conservation  
40 actions, would represent an adverse effect as a result of habitat modification and potential direct  
41 mortality of a special-status species. However, with habitat protection and restoration associated  
42 with the conservation components, guided by landscape-scale goals and objectives and by AMM1-  
43 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 1B as a whole on California tiger  
44 salamander would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
4 term BDCP conservation strategy has been evaluated to determine whether it would provide  
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
6 construction impacts would be less than significant.

7 Alternative 1B would permanently remove approximately 459 acres of upland terrestrial cover  
8 habitat for California tiger salamander. The effects would result from construction of the water  
9 conveyance facilities (CM1, 167 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat  
10 restoration (CM4, 203 acres), and construction of recreational facilities (CM11, 12 acres), and  
11 construction of conservation hatcheries (CM18, 35 acres).

12 Typical CEQA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate  
13 that 918 acres of grassland should be protected in the near-term for California tiger salamander to  
14 mitigate the near-term losses.

15 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
16 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic  
17 habitat (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective  
18 GNC1.1). The landscape-scale goals and objectives would inform the near-term protection and  
19 restoration efforts. The natural community restoration and protection activities are expected to be  
20 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
21 occurrence of impacts to constitute adequate mitigation.

22 In addition, the plan contains commitments to implement AMM1–AMM6, AMM10, AMM13, and  
23 AMM37 which include elements that avoid or minimize the risk of affecting habitats and species  
24 adjacent to work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C,  
25 *Avoidance and Minimization Measures*. These commitments are more than sufficient to support the  
26 conclusion that the near-term impacts of Alternative 1B on California tiger salamander would be  
27 less than significant, because the number of acres required to meet the typical ratios described  
28 above would be only 918 acres of upland communities protected.

29 **Late Long-Term Timeframe**

30 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
31 29,459 acres of upland habitat for California tiger salamander. Alternative 1B as a whole would  
32 result in the permanent loss of and temporary effects on 801 acres of upland habitat for California  
33 tiger salamander for the term of the plan (less than 3% of the total upland habitat in the study area).  
34 The location of these losses is described above in the discussions of CM1, CM2, CM4, CM11, and  
35 CM18.

36 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
37 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
38 benefit the California tiger salamander by providing habitat in the portion of the study area with the  
39 highest long-term conservation value for the species based on known species occurrences and large,  
40 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
41 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
42 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in

1 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
2 depth and duration and suitable composition of vegetative cover to support breeding California tiger  
3 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and  
4 other measures would be implemented as described in CM11 to promote growth of aquatic  
5 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands  
6 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*  
7 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.  
8 This objective would ensure that California tiger salamander upland and associated aquatic habitats  
9 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat  
10 within and adjacent to the study area.

11 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
12 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
13 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could  
14 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres  
15 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal  
16 wetland complex, vernal pool complex, and grassland that could overlap with the species model,  
17 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger  
18 salamander modeled habitat.

19 In the absence of other conservation actions, the losses of California tiger salamander upland habitat  
20 associated with Alternative 1B would represent an adverse effect as a result of habitat modification  
21 and potential direct mortality of a special-status species. However, with habitat protection and  
22 restoration associated with the conservation components, guided by landscape-scale goals and  
23 objectives and by AMM1–AMM6, AMM10, AMM13, and AMM37, which would be in place throughout  
24 the construction phase, the impacts of Alternative 1B as a whole on California tiger salamander  
25 would be less than significant.

#### 26 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

27 Indirect effects could occur outside of the construction footprint but within 500 feet of California  
28 tiger salamander habitat. Activities associated with conservation component construction and  
29 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
30 conveyance facilities, including the transmission facilities, could result in ongoing but periodic  
31 postconstruction disturbances with localized effects on California tiger salamander and its habitat,  
32 and temporary noise and visual disturbances over the term of the BDCP. Most of the areas indirectly  
33 affected are associated with the construction of Byron Forebay and its borrow and spoil areas in CZ  
34 8.

35 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
36 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
37 of California tiger salamander habitat downstream of the construction area by filling in pools and  
38 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the  
39 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants  
40 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
41 quality and California tiger salamander.

42 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 1B  
43 would avoid or minimize the potential for substantial adverse effects on California tiger  
44 salamanders, either indirectly or through habitat modifications. These AMMs would also avoid and



1 minimize effects that could substantially reduce the number of California tiger salamanders or  
2 restrict the species' range. Therefore, the indirect effects of Alternative 1B would not have an  
3 adverse effect on California tiger salamander.

4 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
5 as construction-related noise and visual disturbances could impact California tiger salamander in  
6 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
7 accidental release of petroleum or other contaminants that could impact California tiger salamander  
8 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California tiger  
9 salamander habitat could also have a negative impact on the species or its prey. With  
10 implementation of AMM1-AMM6, AMM10, AMM13, and AMM37 as part of Alternative 1B, the BDCP  
11 would avoid the potential for substantial adverse effects on California tiger salamander, either  
12 indirectly or through habitat modifications, and would not result in a substantial reduction in  
13 numbers or a restriction in the range of California tiger salamanders. The indirect effects of  
14 Alternative 1B would have a less-than-significant impact on California tiger salamander.

#### 15 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a** 16 **Result of Implementation of Conservation Components**

17 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in  
18 periodic inundation of California tiger salamander habitat. Periodic inundation could affect from an  
19 estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an estimated 639 acres  
20 of terrestrial habitat in Yolo Bypass during a notch flow of 4,000 cfs in CZ 1 (Table 12-1B-21). This  
21 effect would only occur during an estimated maximum of 30% of years, in areas that are already  
22 inundated in more than half of all years; therefore, these areas are expected to provide only  
23 marginal terrestrial habitat for the California tiger salamander under Existing Conditions. No aquatic  
24 breeding habitat would be affected (Table 12-1B-21). The modeled habitat in the Yolo Bypass in the  
25 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records  
26 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland  
27 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this  
28 species. Therefore, the terrestrial habitat that would be affected has a small likelihood of supporting  
29 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on  
30 the species, if any.

31 **NEPA Effects:** The effects of periodic inundation from Alternative 1B would not have an adverse  
32 effect on California tiger salamander.

33 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically  
34 increase the frequency and duration of inundation of 191-639 acres of terrestrial habitat for  
35 California tiger salamander. Because this area is considered low-value habitat and there are no  
36 California tiger salamander records in the area, and because of the lack of suitable breeding habitat  
37 in this area, the effects of periodic inundation of California tiger salamander habitat would have a  
38 less-than-significant impact.

#### 39 **Giant Garter Snake**

40 This section describes the effects of Alternative 1B, including water conveyance facilities  
41 construction and implementation of other conservation components, on the giant garter snake. The  
42 habitat model used to assess effects for the giant garter snake is based on aquatic habitat and upland  
43 habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun Marsh),

1 tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and nontidal  
2 perennial aquatic natural communities; rice fields; and artificial canals and ditches. Modeled upland  
3 habitat is composed of all nonwetland and nonaquatic natural communities (primarily grassland  
4 and cropland) within 200 feet of modeled aquatic habitat features. The modeled upland habitat is  
5 ranked as high-, moderate-, or low-value based on giant garter snake associations between  
6 vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical and recent  
7 occurrence records (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
8 *Data Report*; Hansen 2011), and presence of features necessary to fulfill the species' life cycle  
9 requirements. Modeled habitat is expressed in acres for aquatic and upland habitats, and in miles for  
10 linear movement corridors in aquatic habitat. Other factors considered in assessing the value of  
11 affected habitat for the giant garter snake, to the extent that information is available, are proximity  
12 to conserved lands and recorded occurrences of the species, proximity to giant garter snake  
13 subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that  
14 are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and  
15 contribution to connectivity between giant garter snake subpopulations.

16 Construction and restoration associated with Alternative 1B conservation measures would result in  
17 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table  
18 12-1B-22. Full implementation of Alternative 1B would also include the following biological  
19 objectives over the term of the BDCP to benefit the giant garter snake (BDCP Chapter 3, *Conservation*  
20 *Strategy*).

- 21 • Increase native species diversity and relative cover of native plant species, and reduce the  
22 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 23 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
24 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
25 TFEWNC1.1, associated with CM3 and CM4).
- 26 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
27 and nontidal freshwater emergent wetland natural communities, with suitable habitat  
28 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
29 associated with CM3 and CM10).
- 30 • Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other  
31 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 32 • Target cultivated land conservation to provide connectivity between other conservation lands  
33 (Objective CLNC1.2, associated with CM3).
- 34 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
35 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
36 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
37 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
38 with CM3 and CM11).
- 39 • Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create  
40 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500  
41 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective  
42 GGS1.1, associated with CM3, CM4, and CM10).

- 1       ● Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored  
2       under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake  
3       habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or  
4       created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 5       ● Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands  
6       (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot  
7       buffers between protected giant garter snake habitat and roads (other than those roads  
8       primarily used to support adjacent cultivated lands and levees). Establish giant garter snake  
9       reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective  
10      GGS1.3, associated with CM3).
- 11      ● Create connections from the White Slough population to other areas in the giant garter snake's  
12      historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least  
13      1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter  
14      snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater  
15      emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater  
16      emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to  
17      500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored  
18      aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
- 19      ● Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create  
20      600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2  
21      (Objective GGS2.1, associated with CM3 and CM10).
- 22      ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored  
23      under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the  
24      600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,  
25      associated with CM3 and CM8).
- 26      ● To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,  
27      protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder  
28      consisting of compatible cultivated land that can support giant garter snakes. The cultivated  
29      lands may be a subset of lands protected for the cultivated lands natural community and other  
30      covered species (Objective GGS2.3, associated with CM3).
- 31      ● Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or  
32      protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by  
33      establishing 200-foot buffers between protected giant garter snake habitat and roads, and  
34      establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for  
35      urban development (Objective GGS2.4, associated with CM3).
- 36      ● Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,  
37      perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may  
38      consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of  
39      tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets  
40      giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields  
41      in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*  
42      *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value  
43      habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable

1 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with  
2 CM3, CM4, and CM10).

3 As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
4 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes  
5 and would be less than significant for CEQA purposes.

6 **Table 12-1B-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 1B<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic (acres)	120	120	146	146	NA	NA
	Upland (acres)	401	401	273	273	NA	NA
	Aquatic (miles)	21	21	32	32	NA	NA
<b>Total Impacts CM1 (acres)</b>		<b>521</b>	<b>521</b>	<b>419</b>	<b>419</b>		
CM2-CM18	Aquatic (acres)	179	498	15	38	NA	NA
	Upland (acres)	1,467	2,443	219	261	582-1,402	606
	Aquatic (miles)	49	189	9	10	NA	NA
<b>Total Impacts CM2-CM18 (acres)</b>		<b>1,646</b>	<b>2,941</b>	<b>234</b>	<b>299</b>	<b>582-1,402</b>	<b>606</b>
<b>TOTAL IMPACTS CM1-CM18 (acres)</b>		<b>2,167</b>	<b>3,462</b>	<b>653</b>	<b>718</b>	<b>582-1,402</b>	<b>606</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

7

8 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

9 Alternative 1B conservation measures would result in the permanent and temporary loss combined  
10 of up to 802 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,378 acres of  
11 modeled upland habitat, and up to 252 miles of channels providing aquatic movement habitat for  
12 the giant garter snake (Table 12-1B-22). There is one giant garter snake occurrence that overlaps  
13 with the Plan footprint. Conservation measures that would result in these losses are conveyance  
14 facilities and transmission line construction, and establishment and use of RTM (CM1), Fremont  
15 Weir/Yolo Bypass improvements (CM2), tidal natural communities restoration (CM4), floodplain  
16 restoration (CM5), and construction of a conservation fish hatchery (CM18). Habitat enhancement  
17 and management activities (CM11), which include ground disturbance or removal of nonnative

1 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
2 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
3 facilities could degrade or eliminate giant garter snake habitat. Each of these individual activities is  
4 described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
5 conclusion follow the individual conservation measure discussions.

- 6 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would  
7 result in the permanent loss of approximately 521 acres of modeled giant garter snake habitat,  
8 composed of 120 acres of aquatic habitat and 401 acres of upland habitat (Table 12-1B-22). The  
9 401 acres of upland habitat that would be removed for the construction of the conveyance  
10 facilities consists of 166 acres of high-, 218 acres of moderate-, and 17 acres of low-value  
11 habitat. In addition, approximately 21 miles of channels providing giant garter snake movement  
12 habitat would be removed as a result of conveyance facilities construction. Development of the  
13 water conveyance facilities would also result in the temporary removal of 419 acres including  
14 146 acres of giant garter snake aquatic habitat and up to 273 acres of adjacent upland habitat in  
15 areas near construction in CZ 4, CZ 5, CZ 6, and CZ 8 (see Table 12-1B-22 and Terrestrial Biology  
16 Map Book). In addition, approximately 32 miles of channels providing giant garter snake  
17 movement habitat would be temporarily removed as a result of conveyance facilities  
18 construction.

19 Most of the habitat that would be lost is located in the eastern Delta, in CZ 4, CZ 5, CZ 6, and CZ 8.  
20 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction  
21 locations. Water facilities construction and operation is expected to have low to moderate  
22 potential for adverse effects on giant garter snake aquatic habitat in CZ 6 and CZ 8 which  
23 consists primarily of agricultural fields but is not located near or between subpopulations  
24 identified in the draft recovery plan. The aquatic habitat that would be affected in CZ 4 and CZ 5  
25 is of moderate to high value because portions of it are approximately 0.7 to 1.5 miles west of 3  
26 recorded CNDDB giant garter snake occurrences which are part of the Coldani Marsh/White  
27 Slough subpopulation identified in the draft recovery plan.

- 28 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries  
29 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
30 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter  
31 snake in the late long-term. Approximately 14 miles (less than 1% of total miles in Plan Area) of  
32 channels providing giant garter snake habitat for movements would be removed as a result of  
33 Fremont Weir/Yolo Bypass Improvements. Most of this habitat removal would occur at the  
34 north end of the Yolo Bypass, near Fremont Weir. Construction is expected to have adverse  
35 effects on giant garter snake aquatic habitat in the Yolo Bypass area because it is near the Yolo  
36 Basin/Willow Slough subpopulation. The upland habitat that would be removed is composed of  
37 336 acres of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat.

38 In addition to habitat loss from construction related activities in Yolo Bypass, late season  
39 flooding in the bypass may result in loss of rice habitat by precluding the preparation and  
40 planting of rice fields. The methods for estimating loss of rice in the bypass and results are  
41 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter*  
42 *Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated  
43 loss of rice is 1,662 acres.

- 44 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result  
45 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland

1 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat  
2 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and  
3 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant  
4 garter snake movement habitat would be removed as a result of tidal natural communities  
5 restoration.

6 Most of the effects of tidal natural communities restoration would occur in the Cache Slough and  
7 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and  
8 near Category 1 open space but is not near any giant garter snake occurrences and is not near or  
9 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural  
10 communities restoration is expected to have little to no adverse effects on giant garter snake  
11 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences  
12 in this area, which is already tidally influenced so it has limited value for the giant garter snake  
13 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with  
14 a strong tidal influence).

- 15 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
16 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
17 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.  
18 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of  
19 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake  
20 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated  
21 floodplain restoration is expected to have little to no adverse effects on giant garter snake  
22 aquatic habitat because the site is not located near or between giant garter snake populations  
23 identified in the draft recovery plan. As with CM4, the estimates of the effect of seasonal  
24 floodplain levee construction and inundation are based on projections of where restoration may  
25 occur. Actual effects are expected to be lower because sites would be selected to minimize  
26 effects on giant garter snake habitat.
- 27 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
28 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected  
29 habitats may result in localized ground disturbances that could temporarily remove small  
30 amounts of giant garter snake habitat. Ground-disturbing activities, such as removal of  
31 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
32 minor effects on available giant garter snake habitat and are expected to result in overall  
33 improvements to and maintenance of giant garter snake habitat values over the term of the  
34 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
35 and minimized by the AMMs listed below.

36 Passive recreation in the reserve system could result in human disturbance of giant garter  
37 snakes basking in upland areas and compaction of upland burrow sites used for brumation.  
38 However, AMM37, described in BDCP Appendix 3.C, *Avoidance and Minimization Measures*,  
39 requires setbacks for trails in giant garter snake habitat. With this measure in place, recreation-  
40 related effects on giant garter snake are expected to be minimal,

- 41 ● *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the  
42 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in  
43 the Yolo Bypass area (CZ 2).

- 1 ● Operations and maintenance: Postconstruction operation and maintenance of the above-ground  
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
3 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo  
4 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,  
5 and CZ 8). Maintenance activities would include vegetation management, levee and structure  
6 repair, and regrading of roads and permanent work areas. These effects, however, would be  
7 reduced by AMMs and conservation actions as described below.
- 8 ● Injury and direct mortality: Construction vehicle activity may cause injury or mortality of the  
9 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the  
10 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ  
11 4]), the operation of equipment for land clearing, construction, conveyance facilities operation  
12 and maintenance, and habitat restoration, enhancement, and management could result in injury  
13 or mortality of giant garter snakes. This risk is highest from late fall through early spring, when  
14 the snakes are dormant. Increased vehicular traffic associated with BDCP actions could  
15 contribute to a higher incidence of road kill. However, preconstruction surveys would be  
16 implemented after the project planning phase and prior to any ground-disturbing activity. Any  
17 disturbance to suitable aquatic and upland sites in or near the project footprint would be  
18 avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation would be  
19 minimized through adjustments to project design, as practicable. Construction monitoring, and  
20 other measures would be implemented to avoid and minimize injury or mortality of this species  
21 during construction, as described in *AMM16 Giant Garter Snake*.

22 The following paragraphs summarize the combined effects discussed above and describe other  
23 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
24 also included.

### 25 ***Near-Term Timeframe***

26 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
27 term BDCP conservation strategy has been evaluated to determine whether it would provide  
28 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
29 construction would not be adverse under NEPA.

30 Alternative 1B would permanently and temporarily remove 460 acres of aquatic habitat and 2,360  
31 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
32 would result from the construction of the water conveyance facilities (CM1, 266 acres of aquatic and  
33 674 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458  
34 acres of upland habitat), from tidal restoration. (CM4, 111 acres of aquatic and 1,193 acres of upland  
35 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses  
36 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat  
37 losses would occur in cropland and grassland communities. In addition, approximately 111 miles of  
38 irrigation and drainage channels providing giant garter snake movement habitat would be removed.  
39 The habitat model likely overestimates the relative value of irrigation and drainage canals in the  
40 vicinity of White Slough and south due to its proximity to records that likely represent single  
41 displaced snakes, not viable populations.

42 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
43 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
44 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection

1 of upland habitats. Using these ratios would indicate that 460 acres of aquatic habitat should be  
2 restored, 460 acres of aquatic habitat should be protected, and 4,720 acres of upland habitat should  
3 be protected for giant garter snake to mitigate the near-term losses. The BDCP has committed to  
4 near-term restoration of up to 8,100 acres of aquatic habitat and up to 1,140 acres of upland habitat,  
5 and to protection of at least 16,900 acres of upland habitat. Lands to be protected and restored in  
6 the near term specifically for the giant garter snake total 3,900 acres (400 acres nontidal marsh, 400  
7 acres of grassland, 700 acres of cultivated lands including at least 500 acres of rice in CZ 2, and acres  
8 of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5. Additionally, 2,400 acres of rice or  
9 habitat equivalent (1,500 acres under Objective GGS1.4 and 900 acres under Objective GGS3.1)  
10 would be restored or protected to create connections from the Coldani Marsh/White Slough  
11 population to other areas in the giant garter snake historical range. Additionally, 900 of the 2,400  
12 acres of rice land or habitat of equivalent value would be protected and restored for the giant garter  
13 snake to achieve a 1:1 ratio of habitat conserved to habitat affected (habitat affected includes  
14 uplands periodically flooded and rice lost due to late season flooding in Yolo Bypass as a result of  
15 CM2) (Objective GGS3.1). An unknown number of irrigation and drainage ditches located in  
16 cultivated lands and suitable for giant garter snake movement would be maintained and protected  
17 within the reserve system, which would include isolated valley oak trees, trees and shrubs along  
18 field borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
19 grasslands, ponds, and wetlands (Objective CLNC1.3).

20 These habitat protection and restoration measures would benefit the giant garter snake and the  
21 plan's species-specific biological goals and objectives would inform the near-term protection and  
22 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
23 providing connectivity between protected areas, is considered the most effective approach to giant  
24 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
25 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
26 are identified as important for the recovery of the species in the draft recovery plan for the species  
27 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
28 would focus on these two important subpopulations.

29 The species-specific biological goals and objectives would inform the near-term protection and  
30 restoration efforts. The natural community restoration and protection activities are expected to be  
31 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
32 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are  
33 more than sufficient to support the conclusion that the near-term effects of Alternative 1B would be  
34 not be adverse under NEPA, because the number of acres required to meet the typical ratios  
35 described above would be only 460 acres of aquatic communities restored, 460 acres of aquatic  
36 communities protected, and 4,720 acres of upland communities protected.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
41 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
42 *Communities*, *AMM16 Giant Garter Snake*, and *AMM37 Recreation*. All of these AMMs include  
43 elements that avoid or minimize the risk of BDCP activities affecting habitats and species adjacent to  
44 work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance*  
45 *and Minimization Measures*.



1 **Late Long-Term Timeframe**

2 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and  
3 53,285 acres of upland habitat for giant garter snake. Alternative 1B as a whole would result in the  
4 permanent loss of and temporary effects on 802 acres of aquatic habitat and 3,378 acres of upland  
5 habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat in the  
6 study area and 6% of the total upland habitat in the study area). The locations of these losses are  
7 described above in the analyses of individual conservation measures.

8 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
9 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
10 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
11 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
12 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
13 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
14 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
15 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
16 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under  
17 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of  
18 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
19 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of  
20 high value habitat targeted specifically for giant garter snake, the protection and restoration of other  
21 natural communities is expected to provide additional restoration of 4,430 acres and protection of  
22 3,733 acres of garter snake habitat.

23 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
24 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
25 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
26 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
27 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
28 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
29 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

30 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
31 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
32 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
33 connectivity between protected areas, is considered the most effective approach to giant garter  
34 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
35 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
36 and are identified as important for the recovery of the species in the draft recovery plan for the  
37 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
38 habitat would focus on these two important subpopulations.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
40 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
41 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
42 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal  
43 pool complex that could overlap with the species model, would result in the restoration of 3,450  
44 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,  
45 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could

1 overlap with the species model and would result in the protection of 1,547 acres of aquatic and  
2 2,185 acres of upland giant garter snake modeled habitat.

3 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 1B would not  
4 be adverse because the BDCP has committed to protecting and restoring the acreage required to  
5 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter  
6 snake associated with Alternative 1B, in the absence of other conservation actions, would represent  
7 an adverse effect as a result of habitat modification and potential direct mortality of a special-status  
8 species. However, with habitat protection and restoration associated with the conservation  
9 components, guided by landscape-scale goals and objectives and by AMM1–AMM7, AMM10, AMM16,  
10 and AMM37, the effects of Alternative 1B as a whole on giant garter snake would not be adverse.

11 **CEQA Conclusion:**

12 **Near-Term Timeframe**

13 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
14 term BDCP conservation strategy has been evaluated to determine whether it would provide  
15 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
16 construction would be less than significant under CEQA.

17 Alternative 1B would permanently and temporarily remove 460 acres of aquatic habitat and 2,360  
18 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
19 would result from the construction of the water conveyance facilities (CM1, 266 acres of aquatic and  
20 674 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458  
21 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland  
22 habitat), and Conservation Hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses  
23 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat  
24 losses would occur in cropland and grassland communities. In addition, approximately 111 miles of  
25 irrigation and drainage channels providing giant garter snake movement habitat would be removed.  
26 The habitat model likely overestimates the relative value of irrigation and drainage canals in the  
27 vicinity of White Slough and south due to its proximity to records that likely represent single  
28 displaced snakes, not viable populations.

29 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
30 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
31 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
32 of upland habitats. Using these ratios would indicate that 460 acres of aquatic habitat should be  
33 restored, 460 acres of aquatic habitat should be protected, and 4,720 acres of upland habitat should  
34 be protected for giant garter snake to mitigate the near-term losses.

35 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to  
36 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to  
37 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres  
38 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least  
39 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
40 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900  
41 acres under Objective GGS3.1) would be restored or protected to create connections from the  
42 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.  
43 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected

1 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
2 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
3 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage  
4 ditches located in cultivated lands and suitable for giant garter snake movement would be  
5 maintained and protected within the reserve system, which would include isolated valley oak trees,  
6 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
7 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

8 These habitat protection and restoration measures would benefit the giant garter snake and the  
9 plan's species-specific biological goals and objectives would inform the near-term protection and  
10 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
11 providing connectivity between protected areas, is considered the most effective approach to giant  
12 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
13 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
14 are identified as important for the recovery of the species in the draft recovery plan for the species  
15 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
16 would focus on these two important subpopulations.

17 The natural community restoration and protection activities are expected to be concluded during  
18 the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts  
19 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient  
20 to support the conclusion that the near-term effects of Alternative 1B would be less than significant,  
21 because the number of acres required to meet the typical ratios described above would be only 460  
22 acres of aquatic communities restored, 460 acres of aquatic communities protected, and 4,720 acres  
23 of upland communities protected.

24 The Plan also includes commitments to implement AMM1-AMM7, AMM10, AMM16, and AMM37. All  
25 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats  
26 and species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
27 Appendix 3.C, *Avoidance and Minimization Measures*.

### 28 ***Late Long-Term Timeframe***

29 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and  
30 53,285 acres of upland habitat for giant garter snake. Alternative 1B as a whole would result in the  
31 permanent loss of and temporary effects on 802 acres of aquatic habitat and 3,378 acres of upland  
32 habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat in the  
33 study area and 6% of the total upland habitat in the study area). The locations of these losses are  
34 described above in the analyses of individual conservation measures.

35 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
36 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
37 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
38 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
39 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
40 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
41 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
42 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
43 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under  
44 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of

1 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
2 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of  
3 high value habitat targeted specifically for giant garter snake, the protection and restoration of other  
4 natural communities is expected to provide additional restoration of 4,430 acres and protection of  
5 3,733 acres of garter snake habitat.

6 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
7 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
8 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
9 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
10 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
11 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
12 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

13 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
14 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
15 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
16 connectivity between protected areas, is considered the most effective approach to giant garter  
17 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
18 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
19 and are identified as important for the recovery of the species in the draft recovery plan for the  
20 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
21 habitat would focus on these two important subpopulations.

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
23 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
24 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
25 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal  
26 pool complex that could overlap with the species model, would result in the restoration of 3,450  
27 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,  
28 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could  
29 overlap with the species model and would result in the protection of 1,547 acres of aquatic and  
30 2,185 acres of upland giant garter snake modeled habitat.

31 The BDCP also includes AMM1-AMM7, AMM10, AMM16, and AMM37, all of which are directed at  
32 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of  
33 the conservation measures. Considering the protection and restoration provisions, which would  
34 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for  
35 habitats lost to construction and restoration activities, implementation of Alternative 1B as a whole  
36 would not result in a substantial adverse effect through habitat modifications and would not  
37 substantially reduce the number or restrict the range of the species. Therefore, the loss of giant  
38 garter snake habitat and potential mortality of snakes would have a less-than-significant impact on  
39 giant garter snake.

#### 40 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

41 Construction activities outside the project footprint but within 200 feet of construction associated  
42 with water conveyance facilities, conservation components and ongoing habitat enhancement, as  
43 well as operation and maintenance of above-ground water conveyance facilities, including the  
44 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized

1 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of  
2 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,  
3 AMM16, and AMM37, which would be in effect throughout the plan’s construction phase.

4 The use of mechanical equipment during water conveyance facilities construction could cause the  
5 accidental release of petroleum or other contaminants that could affect giant garter snake or its  
6 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake  
7 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize  
8 the likelihood of such spills and would ensure measures are in place to prevent runoff from the  
9 construction area and potential effects of sediment or dust on giant garter snake or its prey. Covered  
10 activities have the potential to exacerbate bioaccumulation of mercury in covered species that feed  
11 on aquatic species, including giant garter snake. The operational impacts of new flows under CM1  
12 were analyzed to assess potential effects on mercury concentration and bioavailability. Results  
13 indicated that changes in total mercury levels in water and fish tissues due to future operational  
14 conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

15 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
16 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
17 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
18 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase  
19 bioavailability of mercury. Increased methylmercury associated with natural community and  
20 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,  
21 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their  
22 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest  
23 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
24 drying and associated anoxic conditions (Alpers et al. 2008). Along with avoidance and minimization  
25 measures and adaptive management and monitoring, *CM12 Methylmercury Management* is expected  
26 to reduce the amount of methylmercury resulting from the restoration of natural communities and  
27 floodplains.

28 Extant populations of giant garter snake within the study area are known only from the upper Yolo  
29 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury  
30 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low  
31 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent  
32 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough  
33 giant garter snake population. Effects on giant garter snake from increased methylmercury  
34 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and  
35 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury  
36 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,  
37 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.  
38 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase  
39 methylmercury production, although production would be minimized by *CM12 Methylmercury*  
40 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not  
41 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to  
42 decrease risk to the giant garter snake, although snakes could prey on individuals that have been  
43 exposed to methylmercury during the previous season.

44 The potential mobilization or creation of methylmercury within the study area varies with site-  
45 specific conditions and will need to be assessed at the project level. *CM12 Methylmercury*

1 *Management* includes provisions for project-specific Mercury Management Plans. Along with  
2 avoidance and minimization measures and adaptive management and monitoring, CM12 is expected  
3 to reduce the effects of methylmercury resulting from BDCP natural communities and floodplain  
4 restoration on giant garter snake.

5 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1B  
6 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or  
7 through habitat modifications and fragmentation. These AMMs would also avoid and minimize  
8 effects that could substantially reduce the number of giant garter snakes or restrict the species'  
9 range. Therefore, the indirect effects of Alternative 1B would not have an adverse effect on giant  
10 garter snake.

11 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
12 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and  
13 upland habitats. The use of mechanical equipment during construction could cause the accidental  
14 release of petroleum or other contaminants that could impact giant garter snake or its prey. The  
15 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also  
16 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,  
17 AMM16, and AMM37 as part of Alternative 1B construction, operation and maintenance, the BDCP  
18 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or  
19 through habitat modifications and fragmentation. Alternative 1B would not result in a substantial  
20 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, the indirect  
21 effects of BDCP Alternative 1B would have a less-than-significant impact on giant garter snakes.

22 Giant garter snake could experience indirect effects from increased exposure to methylmercury as a  
23 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects  
24 of methylmercury would not result in a substantial reduction in numbers or a restriction in the  
25 range of giant garter snakes, and, therefore, would have a less-than-significant impact on giant  
26 garter snakes.

27 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White**  
28 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

29 Construction of Alternative 1B water conveyance facilities would create a substantial barrier to  
30 movement for the Coldani Marsh/White Slough subpopulation of giant garter snake. The facilities  
31 would eliminate Coldani Marsh/White Slough subpopulation connectivity with areas containing  
32 current or previous occurrences of giant garter snake, specifically in the vicinity of Stone Lakes NWR  
33 to the north and in the Delta to the southwest (Figure 12-15B). An unknown number of small  
34 agricultural ditches and drains between Disappointment Slough and Stone Lakes would be lost,  
35 rerouted, or directed into culverts and affect species' movements and connectivity. Siphons would  
36 be constructed underneath sloughs (Disappointment Slough, White Slough, Sycamore Slough, Hog  
37 Slough, and Beaver Slough) and Stone Lakes Drain, and a tunnel would be constructed under the  
38 Lost Slough/Mokelumne River area that connects with Snodgrass Slough. These sloughs and drains  
39 would still provide aquatic habitat and opportunities for movement and connectivity between giant  
40 garter snakes in the vicinity of Stone Lakes NWR and the Coldani Marsh/White Slough  
41 subpopulation. In addition, although Upland Canal, an important aquatic habitat for giant garter  
42 snakes adjacent to the Coldani Marsh, would be cut off from White Slough by the new canal it would  
43 still retain connectivity through Dredger Cut to the south (Figure 12-15B). Maintaining connectivity

1 between major sloughs in the vicinity of White Slough is important for the long-term survival and  
2 conservation of the giant garter snake in the Plan Area.

3 The Coldani Marsh/White Slough giant garter snake subpopulation is located within the White  
4 Slough Wildlife Area (WSWA) managed by CDFW for hunting and fishing. In 2009 and 2010, Eric  
5 Hansen (consulting environmental biologist and giant garter snake expert) surveyed this area as  
6 part of a status survey to provide information for USFWS' 5-year review of giant garter snake. Mr.  
7 Hansen captured a total of 27 individual giant garter snakes in the Upland Canal along the west and  
8 southwest edges of the Coldani Marsh (Hansen 2011). Giant garter snakes were not captured or  
9 observed in any of the ponds or in any of the emergent tidal marshes adjacent to Dredger Cut at  
10 WSWA despite the close proximity and connectivity among habitats (Hansen 2011). This might be  
11 partially due to the fact that Coldani Marsh provides more suitable habitat for giant garter snakes  
12 because the tidal influence is strongly muted, allowing for consistent water supply unlike some of  
13 the emergent tidal marshes adjacent to Dredger Cut, and there is limited access for large aquatic  
14 predators such as largemouth and striped bass in contrast to adjacent ponds. Mr. Hansen noted that  
15 while he did not have access to conduct surveys, several locations near Coldani Marsh and Upland  
16 Canal, including Disappointment Slough, eastern Sycamore Slough, Dredger Cut, and Hog Slough,  
17 contain promising habitat in the study area (Hansen pers. comm.). In addition, Mr. Hansen stated  
18 that there have been recent sightings of giant garter snake in the vicinity of Little Connection Slough  
19 and Empire Tract approximately 6 miles southwest of the Coldani Marsh/White Slough population  
20 (Figure 12-15B).

21 Protecting and expanding existing giant garter snake subpopulations, and providing connectivity  
22 among protected areas, are considered the most effective approaches to giant garter snake  
23 conservation in the study area. The Plan calls for restoration and protection activities for giant  
24 garter snakes in the vicinity of Coldani Marsh/White Slough and Stone Lakes NWR to protect,  
25 conserve, and expand giant garter snake populations. Restoration and protection activities would  
26 occur in the vicinity of the Coldani Marsh/White Slough subpopulation, including the creation of 600  
27 acres of aquatic habitat for the giant garter snake that is adjacent to the 1,500 acres of rice land or  
28 equivalent-value habitat (Objective GGS1.1). Objective GGS1.2 would be to create or protect 200  
29 acres of high-value upland giant garter snake habitat adjacent to the at least 600 acres of aquatic  
30 habitat restored or created in CZ 4 and CZ 5. The Plan also calls for creation of connections from the  
31 Coldani Marsh/White Slough subpopulation to other areas in the giant garter snake's range in the  
32 vicinity of Stone Lakes NWR by protecting, restoring, and/or creating at least 1,500 acres of rice  
33 land or equivalent-value habitat for the giant garter snake in CZ 4 and/or CZ 5 (Objective GGS1.4).  
34 Up to 500 of the 1,500 acres may consist of suitable uplands adjacent to protected or restored  
35 aquatic habitat.

36 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
37 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
38 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
39 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
40 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
41 approximately 281 miles of movement habitat for the giant garter snake. A portion of this would  
42 occur in CZ 4 and CZ 5 and in the vicinity of the Coldani Marsh/White Slough subpopulation.

43 **NEPA Effects:** Restoration and protection of aquatic and upland habitat in CZ 4 and CZ 5 would  
44 improve and create giant garter snake connectivity within the study area; however, construction of  
45 Alternative 1B water conveyance facilities would reduce the effectiveness of these habitats by

1 creating a barrier to movement that extends from Stone Lakes NWR south towards the Coldani  
2 Marsh/White Slough subpopulation, and by creating a barrier to the Delta southwest of Coldani  
3 Marsh/White Slough. The creation of a substantial barrier and loss of movement corridors among  
4 giant garter snake subpopulations would have an adverse effect on giant garter snake.  
5 Implementation of Mitigation Measure BIO-50a, *Provide Connectivity among Coldani Marsh/White*  
6 *Slough, Stone Lakes Wildlife Refuge, and the Delta*, would avoid the potential for substantial adverse  
7 effects on giant garter snake by providing connectivity and maintaining irrigation and drainage  
8 channels that provide aquatic habitat for the snake. Mitigation measure implementation would also  
9 avoid and minimize effects that could substantially reduce the number of giant garter snakes or  
10 restrict the species' range. Therefore, with implementation of Mitigation Measure BIO-50a, the loss  
11 of habitat connectivity resulting from Alternative 1B would not have an adverse effect on giant  
12 garter snake.

13 **CEQA Conclusion:** Alternative 1B water conveyance facilities would create a substantial barrier to  
14 the movement of giant garter snake in the area between the Coldani Marsh/White Slough  
15 subpopulation and Stone Lakes NWR, as well as between the Coldani Marsh/White Slough  
16 subpopulation and the Delta to the southwest. Restoration and protection activities would occur in  
17 the vicinity of the Coldani Marsh/White Slough subpopulation, including the creation or protection  
18 of 200 acres of high-value upland giant garter snake habitat adjacent to the at least 600 acres of  
19 aquatic habitat restored or created in CZ 4 and CZ 5 (Objective GGS1.2). The Plan also calls for  
20 creation of connections between the Coldani Marsh/White Slough subpopulation and other areas  
21 near the giant garter snake's range in vicinity of Stone Lakes NWR by protecting, restoring, and/or  
22 creating at least 1,500 acres of rice land or equivalent-value habitat for the giant garter snake in CZ 4  
23 and/or CZ 5. While restoration and protection of aquatic and upland habitat in CZ 4 and CZ 5 would  
24 improve and create giant garter snake movement corridors within the study area, construction of  
25 Alternative 1B water conveyance facilities would reduce the effectiveness of these habitats by  
26 creating a substantial barrier between Stone Lakes NWR and the Coldani Marsh/White Slough  
27 subpopulation, and a barrier between the Coldani Marsh/White Slough population and the Delta to  
28 the southwest.

29 The Alternative 1B conveyance facilities would result in a significant impact on connections among  
30 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes NWR, and the  
31 Delta. This impact would be reduced to a less-than-significant level with the implementation of  
32 Mitigation Measure BIO-50a, *Provide Connectivity among Coldani Marsh/White Slough, Stone Lakes*  
33 *National Wildlife Refuge, and the Delta*.

34 **Mitigation Measure BIO-50a: Provide Connectivity among Coldani Marsh/White Slough,**  
35 **Stone Lakes National Wildlife Refuge, and the Delta**

36 DWR will protect, create, and restore aquatic and upland habitats with the specific goal of  
37 providing connectivity among giant garter snakes in the Coldani Marsh/White Slough  
38 subpopulation, Stone Lakes NWR, south Delta, and the Delta. Of the 6,540 acres of high-value  
39 habitat targeted specifically for the giant garter snake DWR will ensure that connectivity is  
40 maintained by focusing restoration/protection on high ground on the eastern side of the canal  
41 to promote connectivity in the areas noted above. DWR will provide irrigation and drainage  
42 channels or possibly toe drains along the Alternative 1B water conveyance facilities that could  
43 provide aquatic habitat for the giant garter snake through the protection and management of  
44 cultivated lands in these areas (CM3 and CM11). These irrigation and drainage channels and  
45 ditches would connect to those sloughs described above that would be siphoned or tunneled



1 under and would still provide aquatic habitat and connectivity for giant garter snakes within the  
2 study area. Providing aquatic habitat would be especially important in CZ 4 and CZ 5 where the  
3 Alternative 1B water conveyance facilities would disrupt smaller waterways preferred by giant  
4 garter snakes. In addition, DWR will work with CDFW to manage the White Slough Wildlife Area  
5 ponds and adjacent upland for giant garter snake. Management activities could include  
6 removing large aquatic predators and creating more emergent marsh and upland areas to  
7 provide escape cover and foraging opportunities.

### 8 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of** 9 **Implementation of Conservation Components**

10 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would  
11 occur intermittently from as early as mid-November through as late as mid-May. The core  
12 operations would occur during the winter/spring period, which corresponds mostly with the giant  
13 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter  
14 snakes that occur in the bypass during the active season could potentially overwinter in the bypass  
15 during the inactive season: these snakes may be vulnerable to inundation of the bypass and could be  
16 drowned or displaced from overwintering sites. However, most typically, Fremont Weir "notch"  
17 operations would occur on the shoulders of time periods in which the Sacramento River rises  
18 enough for Fremont Weir to overtop passively, without the proposed project. Project-associated  
19 inundation of areas that would not otherwise have been inundated is expected to occur in no more  
20 than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated 70% of all  
21 years, and during those years notch operations would not typically affect the maximum extent of  
22 inundation. Currently, in more than half of all years, an area greater than the area that would be  
23 inundated as a result of covered activities is already inundated during the snake's inactive season  
24 (Kirkland pers. comm.). Duration of inundation may also be an important factor determining effects  
25 on overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes  
26 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of  
27 inundation the snakes can survive while overwintering in their burrows.

28 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to  
29 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation  
30 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres  
31 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch  
32 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high value habitat and 514  
33 acres of moderate value habitat.

34 As noted above under the discussion of habitat loss from construction-related activities in Yolo  
35 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic  
36 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662  
37 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter*  
38 *Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss  
39 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of  
40 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1  
41 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded  
42 and rice lost due to late season flooding in Yolo Bypass as a result of CM2). *CM5 Seasonally Inundated*  
43 *Floodplain Restoration* would periodically inundate 606 acres of upland habitat for the giant garter  
44 snake in the south Delta (CZ 7). The upland habitat to be inundated contains 432 acres of moderate-  
45 value and 174 acres of low-value habitat. The area between existing levees would be breached and

1 the newly constructed setback levees would be inundated through seasonal flooding. The restored  
2 floodplain will include a range of elevations from low-lying areas that flood frequently (e.g., every 1  
3 to 2 years) to high-elevation areas that flood infrequently (e.g., every 10 years or more). There are  
4 no records of giant garter snakes in the vicinity of where floodplain restoration is expected to occur.

5 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285  
6 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake  
7 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic  
8 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

9 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with  
10 implementing Alternative 1B are not expected to result in substantial adverse effects on giant garter  
11 snakes, either directly or through habitat modifications, as it would not result in a substantial  
12 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, periodic  
13 inundation of giant garter snake habitat under Alternative 1B would not adversely affect the species.

14 **CEQA Conclusion:** Flooding of the Yolo Bypass from CM2 and creation of seasonally inundated  
15 floodplain in various parts of the study area (CM5) would periodically affect a total of approximately  
16 2,008 acres of upland habitat for giant garter snake. The inundation could affect overwintering  
17 snakes. Project-associated inundation of areas that would not otherwise have been inundated is  
18 expected to occur in no more than 30% of all years, since Fremont Weir is expected to overtop the  
19 remaining estimated 70% of all years, and during those years notch operations would not typically  
20 affect the maximum extent of inundation. Currently, in more than half of all years, an area greater  
21 than the area that will be inundated as a result of covered activities is already inundated during the  
22 snake's inactive season (Kirkland pers. comm.).

23 Therefore, increased inundation in the Yolo Bypass as a result of BDCP is expected to have a minimal  
24 effect on the Yolo Basin/Willow Slough population. Therefore, implementing Alternative 1B,  
25 including AMM1-AMM7, AMM10, and AMM16, would not be expected to result in substantial  
26 adverse effects on giant garter snakes, either directly or through habitat modifications, because it  
27 would not result in a substantial reduction in numbers or a restriction in the range of giant garter  
28 snakes. Periodic inundation under Alternative 1B would have a less-than-significant impact on the  
29 species.

### 30 **Western Pond Turtle**

31 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland  
32 nesting and overwintering habitat. Further details regarding the habitat model, including  
33 assumptions on which the model is based, are provided in BDCP Appendix 2.A, Section 2A.30  
34 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,  
35 including upland habitat in natural communities as well as upland in agricultural areas adjacent to  
36 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors  
37 considered in assessing the value of affected aquatic habitat are natural community type and  
38 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in  
39 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to  
40 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on  
41 effects on dispersal habitat because, although dispersal habitat is important for maintaining and  
42 increasing distribution and genetic diversity, turtles have been known to travel over many different  
43 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal

1 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-  
2 value aquatic and nesting and overwintering habitat.

3 Construction and restoration associated with Alternative 1B conservation measures would result in  
4 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table  
5 12-1B-23. The majority of these losses would take place over an extended period of time as tidal  
6 marsh is restored in the study area. Full implementation of Alternative 1B would also include the  
7 following biological objectives over the term of the BDCP to benefit the western pond turtle (BDCP  
8 Chapter 3, *Conservation Strategy*).

- 9 ● Protect or restore 142,200 acres of high-value natural communities and covered species  
10 habitats (Objective L1.1, associated with CM3).
- 11 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
12 accommodate sea level rise. Minimum restoration targets for tidal natural communities in  
13 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in  
14 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA  
15 (Objective L1.3, associated with CM2, CM3, and CM4).
- 16 ● Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),  
17 include sufficient transitional uplands along the fringes of restored brackish and freshwater  
18 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow  
19 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,  
20 associated with CM3, CM4, and CM8).
- 21 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
22 recolonization of vegetation, desirable natural community vegetation is regenerated, and  
23 structural diversity is promoted, or implement management actions that mimic those natural  
24 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 25 ● Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 26 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
27 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
28 TFEWNC1.1, associated with CM3 and CM4).
- 29 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
30 and nontidal freshwater emergent wetland natural communities, with suitable habitat  
31 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
32 associated with CM3 and CM10).
- 33 ● Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly  
34 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 35 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 36 ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
37 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
38 CM3).
- 39 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
40 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
41 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,

1 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
2 with CM3 and CM11).

3 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
4 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes  
5 and would be less than significant for CEQA purposes.

6 **Table 12-1B-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 1B<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic (acres)	48	48	103	103	NA	NA
	Upland <sup>e</sup> (acres)	190	190	86	86	NA	NA
	Aquatic (miles)	19	19	24	24	NA	NA
<b>Total Impacts CM1 (acres)</b>		<b>238</b>	<b>238</b>	<b>189</b>	<b>189</b>		
CM2-CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres)	414	1,028	119	136	283-798	331
	Aquatic (miles)	25	109	3	4	NA	NA
<b>Total Impacts CM2-CM18 (acres)</b>		<b>496</b>	<b>1,142</b>	<b>142</b>	<b>180</b>	<b>283-798</b>	<b>331</b>
<b>TOTAL IMPACTS CM1-CM18 (acres)</b>		<b>734</b>	<b>1,380</b>	<b>331</b>	<b>369</b>	<b>283-798</b>	<b>331</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

<sup>e</sup> Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term

LLT = late long-term

NA = not applicable

7

8 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

9 Alternative 1B conservation measures would result in the permanent and temporary loss of up to  
10 309 acres of aquatic habitat and 1,440 acres of upland nesting and overwintering habitat (Table 12-  
11 1B-23). There are 3 western pond turtle occurrences that overlap with the CM1 footprint and a  
12 number of additional occurrences within the vicinity (Figure 12-16). Activities that would result in  
13 the temporary and permanent loss of western pond turtle modeled habitat are conveyance facilities  
14 and transmission line construction, and establishment and use of RTM, borrow, and spoils areas  
15 (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), seasonally inundated  
16 floodplain restoration (CM5), and riparian restoration (CM7). Habitat enhancement and  
17 management activities (CM11), such as ground disturbance or removal of nonnative vegetation,

1 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
2 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
3 degrade or eliminate western pond turtle habitat. The activity accounting for most (80%) of the  
4 habitat loss or conversion would be *CM4 Tidal Natural Communities Restoration*. Each of these  
5 individual activities is described below. A summary statement of the combined impacts and NEPA  
6 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 7 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would  
8 result in the permanent loss of approximately 48 acres of aquatic habitat and 190 acres of  
9 upland nesting and overwintering habitat for the western pond turtle in the study area (Table  
10 12-1B-23). Development of the water conveyance facilities would also result in the temporary  
11 removal of up to 103 acres of aquatic habitat and 86 acres of nesting and overwintering habitat  
12 for the western pond turtle in the study area (see Table 12-1B-23). Approximately 19 miles of  
13 channels providing western pond turtle movement habitat would be removed and 24 miles  
14 would be temporarily disturbed. There are three western pond turtle occurrences that overlap  
15 with the CM1 footprint in CZ 2 around Clifton Court Forebay and in CZ 5 scattered throughout  
16 the Delta. The majority of the permanent loss of aquatic habitat and nesting and overwintering  
17 habitat would be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial Biology Map Book  
18 for a detailed view of Alternative 1B construction locations. The aquatic habitat in the Clifton  
19 Court Forebay area is considered to be of reasonably high value because it consists of  
20 agricultural ditches in or near known species occurrences. The nesting and overwintering and  
21 dispersal habitat that would be lost consists primarily of cultivated lands with some small  
22 portion of ruderal grassland habitat. Except for remnant, uncultivated patches, the cultivated  
23 lands are not suitable for nesting and overwintering unless left fallow. Construction of the water  
24 conveyance facilities would also affect dispersal habitat, which is primarily cultivated lands.  
25 While there are western pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6,  
26 this effect is widely dispersed because of the long, linear nature of the canal footprint.
- 27 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
28 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres of  
29 upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles of  
30 channels providing western pond turtle movement habitat would be permanently or  
31 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDDB  
32 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in  
33 the Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2013).
- 34 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural community restoration would result  
35 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting  
36 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of  
37 channels providing western pond turtle movement habitat would be removed as a result of  
38 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions  
39 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat  
40 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse  
41 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create  
42 suitable, slow-moving freshwater slough and marsh habitat.

43 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent  
44 wetland, and managed wetland as habitat, most of the Suisun Marsh pond turtle observations  
45 have been in the interior drainage ditches or near water control structures not hydrologically  
46 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an

1 aquatic class type called drainage ditches and therefore an effect on this habitat type cannot be  
2 calculated, it is likely that this general type of habitat accounts for a very small portion of the  
3 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the  
4 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering  
5 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely  
6 function as the primary nesting and overwintering habitat. The nesting and overwintering  
7 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is  
8 adjacent to undeveloped grassland habitat. The habitat affected in the interior Delta (West Delta  
9 and South Delta) is of low value, consisting of levees and intensively farmed cultivated lands,  
10 while the Cache Slough and Cosumnes-Mokelumne ROAs are less intensively farmed and have  
11 higher-value habitat for the turtle

12 Because the estimates of the effect of tidal inundation are based on projections of where  
13 restoration may occur, actual effects are expected to be lower because sites would be selected to  
14 minimize effects on western pond turtle habitat (see AMM17 in BDCP Appendix 3.C).

- 15 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
16 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
17 approximately 53 acres of aquatic habitat 33 acres of upland habitat for western pond turtle.  
18 Approximately 3 miles of channels providing western pond turtle movement habitat would be  
19 removed as a result of floodplain restoration. Although there are no CNDDDB occurrences of the  
20 western pond turtle in the areas where floodplain restoration is likely to occur, the species is  
21 known to occur along the San Joaquin River to the south in the San Joaquin River National  
22 Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain levee  
23 construction and inundation are based on projections of where restoration may occur. Actual  
24 effects are expected to be lower because sites would be selected to minimize effects on western  
25 pond turtle habitat.
- 26 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural  
27 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of  
28 upland nesting and overwintering habitat for western pond turtle.
- 29 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
30 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected  
31 habitats may result in localized ground disturbances that could temporarily remove small  
32 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of  
33 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
34 minor adverse effects on available western pond turtle habitat and are expected to result in  
35 overall improvements to and maintenance of western pond turtle habitat values over the term  
36 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.
- 37 ● Management of the 6,600 acres of managed wetlands to be protected for waterfowl and  
38 shorebirds is not expected to result in overall adverse effects for the western pond turtle.  
39 Management actions that would improve wetland quality and diversity on managed wetlands  
40 include control and eradication of invasive plants; maintenance of a diversity of vegetation types  
41 and elevations, including upland areas to provide flood refugia; water management and leaching  
42 to reduce salinity; and enhancement of water management infrastructure (improvements to  
43 enhance drainage capacity, levee maintenance). These management actions could benefit the  
44 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and

1 adaptively managed to ensure that management options are implemented to avoid adverse  
2 effects on the western pond turtle.

- 3 ● Operations and maintenance: Ongoing maintenance of BDCP facilities is expected to have little if  
4 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of  
5 the above-ground water conveyance facilities and restoration infrastructure could result in  
6 ongoing but periodic disturbances that could affect western pond turtle use where there is  
7 suitable habitat in the study area. Maintenance activities would include vegetation management,  
8 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
9 however, would be minimized by AMMs and conservation actions described below.
- 10 ● Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of  
11 western pond turtles. If turtles reside where conservation measures are implemented (most  
12 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land  
13 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,  
14 enhancement, and management could result in injury or mortality of western pond turtles.  
15 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable  
16 aquatic upland habitat for the western pond turtle, and turtles found would be relocated outside  
17 the construction areas, as required by the AMMs listed below.

18 The following paragraphs summarize the combined effects discussed above and describe other  
19 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
20 also included.

### 21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
23 term BDCP conservation strategy has been evaluated to determine whether it would provide  
24 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
25 construction would not be adverse under NEPA.

26 Alternative 1B would remove 256 acres of aquatic habitat and 809 acres of upland nesting and  
27 overwintering habitat for western pond turtle in the near-term. These effects would result from  
28 water conveyance facilities construction (CM1, 151 acres of aquatic and 276 acres of upland  
29 habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of upland habitat), tidal  
30 habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat), and riparian  
31 restoration (CM7, 4 acres of upland habitat). Typical project-level mitigation ratios for those natural  
32 communities that would be affected and that are identified in the biological goals and objectives for  
33 western pond turtle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of  
34 aquatic habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that 256  
35 acres of aquatic habitat should be restored, 256 acres of aquatic habitat should be protected, and  
36 1,618 acres of upland habitat should be protected for western pond turtle to mitigate the near-term  
37 losses.

38 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
39 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
40 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
41 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
42 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
43 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).

1 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh  
2 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater  
3 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed  
4 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh  
5 to benefit the western pond turtle.

6 The natural community restoration and protection activities would be concluded in the first 10  
7 years of Plan implementation, which is close enough in time to the impacts of construction to  
8 constitute adequate mitigation. Because the number of acres required to meet the typical ratios  
9 described above would be only 256 acres of aquatic communities protected, 256 acres restored, and  
10 1,618 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of upland  
11 habitats restored or created in the near-term Plan goals, and the additional detail in the biological  
12 goals for western pond turtle, are more than sufficient to support the conclusion that the near-term  
13 impacts of habitat loss and direct mortality under Alternative 1B on western pond turtles would not  
14 be adverse.

15 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
16 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
17 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, and AMM17 Western*  
20 *Pond Turtle*. These AMMs include elements that would avoid or minimize the risk of affecting  
21 habitats and species adjacent to work areas and storage sites. The AMMs are described in detail in  
22 BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 23 **Late Long-Term Timeframe**

24 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and  
25 28,864 acres of upland habitat for giant garter snake. Alternative 1B would remove 309 acres of  
26 aquatic habitat and 1,440 acres of upland nesting and overwintering habitat for western pond turtle  
27 in the late long--term.

28 Implementation of Alternative 1B as a whole would increase the extent and distribution of high-  
29 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study  
30 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this  
31 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be  
32 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond  
33 turtle.

34 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
35 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
36 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
37 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
38 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
39 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective  
40 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
41 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
42 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
43 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are  
44 preserved and managed as part of the 48,625 acres of protected cultivated lands described above



1 for giant garter snake are also expected to benefit the species. Additionally, basking platforms will  
2 be installed as needed in restored freshwater marsh to benefit the western pond turtle.

3 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
4 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
5 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
6 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
7 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
8 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
9 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
10 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
11 rabbit.

12 The study area represents only a small portion of the range of the western pond turtle in California  
13 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
14 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
15 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
16 western pond turtle because for the following reasons.

- 17 • The study area represents a small portion of the species' entire range.
- 18 • Only 1% of the habitat in the study area would be removed or converted.

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
20 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
21 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
22 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,  
23 valley foothill riparian, that could overlap with the species model, would result in the restoration of  
24 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In  
25 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian  
26 could overlap with the species model and would result in the protection of 1,281 acres of aquatic  
27 and 4,993 acres of upland western pond turtle modeled habitat.

28 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 1B would  
29 not be adverse because the BDCP has committed to protecting and restoring the acreage required to  
30 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond  
31 turtle habitat associated with Alternative 1B, in the absence of other conservation actions, would  
32 represent an adverse effect as a result of habitat modification and potential direct mortality of a  
33 special-status species. However, with habitat protection and restoration associated with the  
34 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
35 AMM10, and AMM17, the effects of Alternative 1B as a whole on western pond turtle would not be  
36 adverse.

### 37 **CEQA Conclusion:**

#### 38 **Near-Term Timeframe**

39 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
42 impacts of construction would be less than significant.

1 Alternative 1B would remove 256 acres of aquatic habitat and 809 acres of upland nesting and  
2 overwintering habitat for western pond turtle in the near-term. These effects would result from  
3 water conveyance facilities construction (CM1, 151 acres of aquatic and 276 acres of upland  
4 habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of upland habitat), tidal  
5 habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat), and riparian  
6 restoration (CM7, 4 acres of upland habitat). Typical CEQA project-level mitigation ratios for those  
7 natural communities that would be affected and that are identified in the biological goals and  
8 objectives for western pond turtle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for  
9 protection of aquatic habitats and 2:1 for protection of upland habitats. Using these ratios would  
10 indicate that 256 acres of aquatic habitat should be restored, 256 acres of aquatic habitat should be  
11 protected, and 1,618 acres of upland habitat should be protected for western pond turtle to mitigate  
12 the near-term losses.

13 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
14 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
15 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
16 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
17 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
18 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).  
19 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh  
20 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater  
21 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed  
22 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh  
23 to benefit the western pond turtle.

24 The natural community restoration and protection activities would be concluded in the first 10  
25 years of Plan implementation, which is close enough in time to the impacts of construction to  
26 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet  
27 the typical ratios described above would be only 256 acres of aquatic communities protected, 256  
28 acres restored, and 1,618 acres of upland communities protected, the 24,350 acres of aquatic and  
29 2,000 acres of upland habitats restored or created in the near-term Plan goals, and the additional  
30 detail in the biological goals for western pond turtle, are more than sufficient to support the  
31 conclusion that the near-term impacts of habitat loss and direct mortality under Alternative 1B on  
32 western pond turtles would be less than significant.

33 In addition, the plan also contains commitments to implement AMM1–AMM6, AMM10, and AMM17,  
34 which include elements that would avoid or minimize the risk of directly and indirectly affecting  
35 habitats and species habitats adjacent to work areas and storage sites. The AMMs are described in  
36 detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 37 ***Late Long-Term Timeframe***

38 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and  
39 28,864 acres of upland habitat for giant garter snake. Alternative 1B would remove 309 acres of  
40 aquatic habitat and 1,440 acres of upland nesting and overwintering habitat for western pond turtle  
41 in the late long-term.

42 Implementation of Alternative 1B as a whole would increase the extent and distribution of high-  
43 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study  
44 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this

1 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be  
2 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond  
3 turtle.

4 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
5 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
6 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
7 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
8 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
9 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective  
10 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
11 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
12 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
13 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are  
14 preserved and managed as part of the 48,625 acres of protected cultivated lands described above  
15 for giant garter snake are also expected to benefit the species. Additionally, basking platforms will  
16 be installed as needed in restored freshwater marsh to benefit the western pond turtle.

17 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
18 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
19 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
20 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
21 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
22 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
23 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
24 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
25 rabbit.

26 The study area represents only a small portion of the range of the western pond turtle in California  
27 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
28 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
29 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
30 western pond turtle because for the following reasons.

- 31 ● The study area represents a small portion of the species' entire range.
- 32 ● Only 1% of the habitat in the study area would be removed or converted.

33 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
34 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
35 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
36 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,  
37 valley foothill riparian, that could overlap with the species model, would result in the restoration of  
38 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In  
39 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian  
40 could overlap with the species model and would result in the protection of 1,281 acres of aquatic  
41 and 4,993 acres of upland western pond turtle modeled habitat.

42 The loss of western pond turtle habitat associated with Alternative 1B would represent an adverse  
43 effect as a result of special-status species habitat modification and the potential direct mortality of  
44 turtles. However, considering the habitat restoration and protection associated with the

1 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
2 AMM10, and AMM17, which would be in place throughout the construction phase, the loss of habitat  
3 and potential mortality would not have an adverse effect on western pond turtle. Therefore, the loss  
4 of western pond turtle habitat and potential mortality of turtles from Alternative 1B would be less  
5 than significant.

### 6 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

7 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily  
8 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the  
9 western pond turtle. Construction activities outside the construction footprint but within 200 feet of  
10 water conveyance facilities, conservation components and ongoing habitat enhancement, as well as  
11 operation and maintenance of above-ground water conveyance facilities, including the transmission  
12 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on  
13 western pond turtle habitat, and temporary noise and visual disturbances over the term of the  
14 BDCP.

15 The use of mechanical equipment during water conveyance facilities construction could cause the  
16 accidental release of petroleum or other contaminants that could affect western pond turtle or its  
17 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond  
18 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and  
19 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to  
20 prevent runoff from the construction area and potential effects of sediment or dust on western pond  
21 turtle or its prey.

22 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be  
23 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the  
24 salinity of water in Suisun Marsh would generally increase as a result of water operations and  
25 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full  
26 implementation of the BDCP show salinity to double by the late long-term compared with current  
27 conditions during late fall and winter months. Changes in salinity would not be uniform across  
28 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than  
29 others, and most of the salinity increase would occur during the fall and winter. Western pond  
30 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and  
31 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh  
32 pond turtle observations have been in the interior drainage ditches or near water control structures  
33 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity  
34 would occur. Therefore, the potential effects associated with changes in salinity are not expected to  
35 adversely affect western pond turtles.

36 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 1B,  
37 the BDCP would avoid the potential for adverse effects on western pond turtles, either directly or  
38 through habitat modifications. These AMMs would also avoid and minimize effects that could  
39 substantially reduce the number of western pond turtles or restrict the species range. Therefore, the  
40 indirect effects of Alternative 1B would not have an adverse effect on western pond turtle.

41 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance  
42 as well as construction-related noise and visual disturbances could impact western pond turtle in  
43 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
44 accidental release of petroleum or other contaminants that could affect western pond turtle or its

1 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle  
2 habitat could also have a negative effect on the species or its prey. Changes in water salinity would  
3 have a less-than-significant impact on western pond turtles because most of the salinity increases  
4 would occur in areas not used extensively by western pond turtles. With implementation of AMM1–  
5 AMM6, AMM10, and AMM17 as part of Alternative 1B construction, operation, and maintenance, the  
6 BDCP would avoid the potential for substantial adverse effects on western pond turtles, either  
7 indirectly or through habitat modifications, and would not result in a substantial reduction in  
8 numbers or a restriction in the range of western pond turtles. The indirect effects of BDCP  
9 Alternative 1B would have a less-than-significant impact on western pond turtles.

10 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of**  
11 **Implementation of Conservation Components**

12 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect  
13 western pond turtle and its upland habitat. Appendix 5.J, *Effects on Natural Communities, Wildlife,*  
14 *and Plants* provides the method used to estimate periodic inundation effects in the Yolo Bypass.  
15 Based on this method, periodic inundation could affect from an estimated 283 acres of habitat  
16 during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow (Table  
17 12-1B-23). This effect would occur during an estimated maximum of 30% of years, in areas that are  
18 already inundated in more than half of all years; therefore, these areas are expected to provide only  
19 marginal overwintering habitat for the western pond turtle under Existing Conditions. Furthermore,  
20 Yolo Bypass inundation is not expected to affect nesting western pond turtles because operations  
21 would not occur during the nesting season (approximately May through October). Therefore, Yolo  
22 Bypass operations are expect to have a minimal effect, if any, on western pond turtles in the Yolo  
23 Bypass.

24 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland  
25 habitat for the western pond turtle in the south Delta (CZ 7Seasonal flooding in restored floodplains  
26 is not expected to adversely affect aquatic and dispersal habitat, because these habitat functions are  
27 expected to remain in the seasonally inundated floodplains. Floodplains are not expected to be  
28 inundated during the nesting season; however, turtle hatchlings may overwinter in the nest and  
29 could be affected by flooding. Restored floodplains would transition for areas that flood frequently  
30 (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more); adverse  
31 effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain, where  
32 frequent flooding occurs.

33 **NEPA Effects:** Periodic inundation of upland habitat for western pond turtle from CM2 and CM5  
34 associated with implementing Alternative 1B is not expected to result in adverse effects either  
35 directly or through habitat modifications, as it would not result in a substantial reduction in  
36 numbers or a restriction in the range of western pond turtles. Therefore, periodic inundation of  
37 western pond turtle habitat under Alternative 1B would not adversely affect the species.

38 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in  
39 various parts of the study area would periodically affect a total of up to 283-798 acres from CM2 and  
40 approximately 331 acres from CM5 of upland habitat for western pond turtle These acreages  
41 represent only 1% of the total upland western pond turtle habitat in the study area. Most of the  
42 increase in inundation would occur in the winter and early spring months, when western pond  
43 turtles may be in the water or overwintering and occupying upland habitats. Therefore,  
44 implementing Alternative 1B, including AMM1–AMM6, AMM10, and AMM17, would not be expected

1 to result in substantial adverse effects on western pond turtle, either directly or through habitat  
2 modifications, because it would not result in a substantial reduction in numbers or a restriction in  
3 the range of western pond turtles. Periodic inundation under Alternative 1B would have a less-than-  
4 significant impact on the species.

### 5 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville's Horned Lizard**

6 This section describes the effects of Alternative 1B on the silvery legless lizard, San Joaquin  
7 coachwhip and Blainville's horned lizard (special-status reptiles). The habitat types used to assess  
8 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),  
9 which would not be affected by construction or restoration activities. This species is not discussed  
10 any further.

11 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland  
12 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and  
13 West Canal (CZ 8). The habitat types used to assess effects on the Blainville's horned lizard are the  
14 same as those for the whipsnake in CZ 7 and CZ 8. There is also potential habitat for the horned  
15 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San  
16 Joaquin coachwhip and Blainville's horned lizard extends into the study area, there are no records  
17 for either of these species within the study area (California Department of Fish and Wildlife 2013).

18 Alternative 1B is expected to result in the temporary and permanent removal of habitat that special-  
19 status reptiles uses for cover and dispersal (Table 12-1B-24). BDCP actions that could affect this  
20 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity  
21 of Clifton Court Forebay, and grassland restoration, protection and management. Full  
22 implementation of Alternative 1B would also include the following biological objectives over the  
23 term of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation*  
24 *Strategy*).

- 25 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
26 between existing conservation lands (Objective L1.6, associated with CM3).
- 27 ● Increase native species diversity and relative cover of native plant species, and reduce the  
28 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 29 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
30 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
31 associated with CM3, CM8, and CM11).
- 32 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 33 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
34 (Objective GNC1.2, associated with CM3 and CM8).

35 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
36 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA  
37 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-24. Changes in Special-Status Reptile Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	170	170	165	165	NA	NA
<b>Total Impacts CM1</b>		<b>170</b>	<b>170</b>	<b>165</b>	<b>165</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Grassland	0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS CYL/SJW</b>		<b>170</b>	<b>170</b>	<b>165</b>	<b>165</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**  
4 **Reptiles**

5 Alternative 1B conservation measures would result in the permanent and temporary loss of 335  
6 acres of potential habitat for special-status reptiles (Table 12-1B-24). Water conveyance facilities  
7 and transmission line construction, including establishment and use of RTM, borrow and spoils  
8 areas, (CM1) would cause the loss of special-status reptile habitat. In addition, habitat enhancement  
9 and management activities (CM11), such as ground disturbance or removal of nonnative vegetation,  
10 could result in local adverse habitat effects for special-status reptiles. In addition to habitat loss and  
11 conversion, construction activities, such as grading, the movement of construction vehicles or heavy  
12 equipment, and the installation of water conveyance facilities components and new transmission  
13 lines, may result in the direct mortality, injury, or harassment of special-status reptiles, including the  
14 potential crushing of individuals and disruption of essential behaviors. Construction of access roads  
15 could fragment suitable habitat, potentially impede upland movements in some areas, and increase  
16 the risk of road mortality. Construction activities related to conservation components could have  
17 similar affects. Each of these individual activities is described below. A summary statement of the  
18 combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation  
19 measure discussions.

- 20 ● *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the  
21 permanent loss of approximately 170 acres of potential habitat for special-status reptiles in the  
22 vicinity of Clifton Court Forebay and Stone Lakes. Construction-related effects would  
23 temporarily disturb 165 acres for both species in the study area.
- 24 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
25 actions included in *CM11* that are designed to enhance wildlife values in BDCP-protected  
26 habitats may result in localized ground disturbances that could temporarily remove small

1 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of  
2 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
3 minor adverse effects on available special-status reptile habitat and are expected to result in  
4 overall improvements to and maintenance of species habitat values over the term of the BDCP.  
5 These effects cannot be quantified, but are expected to be minimal and would be reduced  
6 through implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*  
7 *Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures.*

- 8 ● Operations and maintenance: Ongoing facilities operation and maintenance is expected to have  
9 little if any adverse effect on special-status reptiles. Postconstruction operation and  
10 maintenance of the above-ground water conveyance facilities could result in ongoing but  
11 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study  
12 area. These effects, however, would be minimized with implementation of Mitigation Measure  
13 BIO-55.
- 14 ● Injury and direct mortality: Construction vehicles may cause injury to or mortality of special-  
15 status reptiles. The operation of equipment for land clearing, construction, operation and  
16 maintenance, and restoration, enhancement, and management activities could result in injury or  
17 mortality. This risk is highest from late fall through early spring, when special-status reptiles are  
18 not as active. Increased vehicular traffic associated with BDCP actions could contribute to a  
19 higher incidence of road kill. However, conducting construction during the late-spring through  
20 early fall periods when feasible and implementation of Mitigation Measure BIO-55 would avoid  
21 and minimize injury or mortality of special-status reptiles during construction.

22 The following paragraphs summarize the combined effects discussed above and describe other  
23 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
24 also included.

### 25 ***Near-Term Timeframe***

26 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
27 term BDCP conservation strategy has been evaluated to determine whether it would provide  
28 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
29 construction effects would not be adverse under NEPA.

30 Alternative 1B would remove 335 acres of grassland habitat for California horned lizard and 341  
31 acres of grassland habitat for San Joaquin whipsnake under CM1. The typical NEPA mitigation ratio  
32 (2:1 for protection) for this natural community would indicate that up to 670 acres should be  
33 protected for both species in the near-term to offset CM1 losses.

34 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
35 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all  
36 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
37 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

38 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55.  
39 to avoid and minimize injury or mortality of special-status reptiles during construction, the  
40 permanent and temporary loss of special-status reptile habitat and the potential mortality of either  
41 species from Alternative 1B would not be an adverse effect.



1 **Late Long-Term Timeframe**

2 Alternative 1B as a whole would result in the permanent loss of up to 335 acres of special-status  
3 reptile habitat over the life of the plan.

4 Effects of water conveyance facilities construction would be offset through the plan's long-term  
5 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal  
6 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan area.  
7 Grassland protection would focus in particular on acquiring the largest remaining contiguous  
8 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 ((Objective  
9 GNC1.1). This area connects to more than 620 acres of existing habitat that is protected under the  
10 East Contra Costa County HCP/NCCP.

11 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*  
12 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable CM22*  
13 *Measures*. The plan as a whole is expected to benefit special-status reptiles that could be present by  
14 protecting potential habitat from loss or degradation that otherwise could occur with future changes  
15 in existing land use. To the extent that grassland habitat is restored in CZ 8, restoration would  
16 remove unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-  
17 value cover, foraging, and dispersal habitat. The overall effect would be beneficial because the  
18 Alternative 1B would result in a net increase in acreage of grassland habitat in the Plan Area.

19 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
20 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
21 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
22 construction.

23 **NEPA Effects:** In the near-term and late long-term, the loss of special-status reptile habitat under  
24 Alternative 1B would be not be adverse because the BDCP has committed to protecting the acreage  
25 required to meet the typical mitigation ratios described above. In addition, Mitigation Measure BIO-  
26 55 would be available to address effects of habitat loss.

27 **CEQA Conclusion:**

28 **Near-Term Timeframe**

29 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
30 term BDCP conservation strategy has been evaluated to determine whether it would provide  
31 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
32 construction impacts would be less than significant.

33 Alternative 1B would remove 335 acres of special-status reptile habitat as a result of CM1.

34 The typical CEQA mitigation ratio (2:1 for protection) for this natural community would indicate  
35 that up to 670 acres should be protected for both species in the near-term to offset CM1 losses.

36 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
37 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all  
38 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
39 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

1 The natural community restoration and protection activities are expected to be concluded during  
2 the first 10 years of Plan implementation, which is close enough to the timing of construction  
3 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy  
4 and the implementation of Mitigation Measure BIO-55, the permanent and temporary loss of  
5 special-status reptile habitat and the potential mortality of either species would be a less-than-  
6 significant impact.

### 7 **Late Long-Term Timeframe**

8 Alternative 1B as a whole would result in the permanent loss of up to 335 acres of special-status  
9 reptile habitat over the life of the plan. Effects of water conveyance facilities construction would be  
10 offset through the plan's long-term commitment to protect up to 8,000 acres of grassland, and  
11 grassland associated with alkali seasonal wetlands and vernal pool complexes, and to restore 2,000  
12 acres of grassland in the Plan area (Objective GNC1.1 and Objective GNC1.2). Grassland protection  
13 would focus in particular on acquiring the largest remaining contiguous patches of unprotected  
14 grassland habitat, which are located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to  
15 more than 620 acres of existing habitat that is protected under the East Contra Costa County  
16 HCP/NCCP.

17 Other impacts would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*  
18 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable CM22*  
19 *Measures*. The plan as a whole is expected to benefit special-status reptiles that could be present by  
20 protecting potential habitat from loss or degradation that otherwise could occur with future changes  
21 in existing land use. To the extent that grassland habitat is restored in CZ 8, restoration would  
22 remove unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-  
23 value cover, foraging, and dispersal habitat. The overall impact would be beneficial because  
24 Alternative 1B would result in a net increase in acreage of grassland habitat in the study area.

25 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
26 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
27 CZ 8 would sufficiently offset the impacts resulting from water conveyance facilities construction.  
28 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55,  
29 the permanent and temporary loss of special-status reptile habitat and the potential mortality of  
30 either species under Alternative 1B would not result in a significant impact.

### 31 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special- 32 Status Reptiles and Implement Applicable CM22 Measures**

33 DWR will retain a qualified biologist to conduct a habitat assessment in areas that are relatively  
34 undisturbed or have a moderate to high potential to support noncovered special-status reptiles  
35 (Blainville's horned lizard and San Joaquin coachwhip) in CZ 4, CZ 7, and CZ 8. The qualified  
36 biologist will survey for noncovered special-status reptiles in areas of suitable habitat  
37 concurrent with the preconstruction surveys for covered species in CZ 4, CZ 7, and CZ 8. If  
38 special-status reptiles are detected, the biologist will passively relocate the species out of the  
39 work area prior to construction if feasible.

40 In addition, *CM22 Avoidance and Minimization Measures*, specifically *AMM1 Worker Awareness*  
41 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and*  
42 *Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, and *AMM10 Restoration of*

1            *Temporarily Affected Natural Communities*, would be implemented for all noncovered special-  
2            status reptiles adversely affected by the BDCP to avoid, minimize, or compensate for impacts.

3            **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

4            Construction activities associated with water conveyance facilities, conservation components and  
5            ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
6            conveyance facilities, including the transmission facilities, could result in ongoing periodic  
7            postconstruction disturbances and noise with localized effects on special-status reptiles and their  
8            habitat over the term of the BDCP. In addition, construction activities could indirectly affect special-  
9            status reptiles if construction resulted in the introduction of invasive weeds that create vegetative  
10           cover that is too dense for the species to navigate. Construction vehicles and equipment can  
11           transport in their tires and various parts under the vehicles invasive weed seeds and vegetative  
12           parts from other regions to construction sites, resulting in habitat degradation. These potential  
13           effects would be reduced through implementation of AMM10 *Restoration of Temporarily Affected*  
14           *Natural Communities*.

15           Water conveyance facilities operations and maintenance activities would include vegetation and  
16           weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
17           levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
18           activities are not expected to remove special-status reptile habitat, operation of equipment could  
19           disturb small areas of vegetation around maintained structures and could result in injury or  
20           mortality of individual special-status reptiles, if present.

21           **NEPA Effects:** Implementation of the Mitigation Measures BIO-55, *Conduct Preconstruction Surveys*  
22           *for Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures*, would avoid the  
23           potential for substantial adverse effects on these species, either indirectly or through habitat  
24           modifications. The mitigation measures would also avoid and minimize effects that could  
25           substantially reduce the number of special-status reptiles, or restrict either species' range.  
26           Therefore, with implementation of Mitigation Measure BIO-55, the indirect effects of Alternative 1B  
27           on special-status reptiles would not be an adverse effect under NEPA.

28           **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
29           as construction-related noise and visual disturbances could impact special-status reptiles. In  
30           addition, construction activities could indirectly affect special-status reptiles if construction resulted  
31           in the introduction of invasive weeds that create vegetative cover that is too dense for the species to  
32           navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and  
33           weed control, and road maintenance, are not expected to remove special-status reptile habitat, but  
34           operation of equipment could disturb small areas of vegetation around maintained structures and  
35           could result in injury or mortality of individual special-status reptiles, if present. With  
36           implementation of Mitigation Measure BIO-55 as part of Alternative 1B construction, operation, and  
37           maintenance, the BDCP would avoid the potential for significant effects on special-status reptile  
38           species, either indirectly or through habitat modifications, and would not result in a substantial  
39           reduction in numbers or a restriction in the range of either species. With implementation of  
40           Mitigation Measure BIO-55, the indirect effects of BDCP Alternative 1B would have a less-than-  
41           significant impact on special-status reptiles.

1           **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**  
2           **Status Reptiles and Implement Applicable CM22 Measures**

3           See description of Mitigation Measure BIO-55 under Impact BIO-55.

4           **California Black Rail**

5           This section describes the effects of Alternative 1B, including water conveyance facilities  
6           construction and implementation of other conservation components, on California black rail. The  
7           habitat model used to assess effects on the California black rail is based on primary breeding habitat  
8           and secondary habitat. Primary (breeding) habitat for this species within the Delta consists of all  
9           *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches  
10          greater than 0.55 acre (essentially, instream islands of the San Joaquin River and its tributaries and  
11          White Slough Wildlife Area). In Suisun Marsh, primary habitat consists of all *Schoenoplectus* and  
12          *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that  
13          all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed  
14          wetlands, in general, are considered secondary habitat with lesser ecological value. Upland  
15          transitional zones, providing refugia during high tides, within 150 feet of the tidal wetland edge  
16          were also included as secondary habitat. Secondary habitats generally provide only a few ecological  
17          functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland  
18          transition zones), while primary habitats provide multiple functions, including breeding, effective  
19          predator cover, and valuable foraging opportunities.

20          Construction and restoration associated with Alternative 1B conservation measures would result in  
21          both temporary and permanent losses of California black rail modeled habitat as indicated in Table  
22          12-1B-25. Full implementation of Alternative 1B would also include the following conservation  
23          actions over the term of the BDCP to benefit the California black rail (BDCP Chapter 3, Section 3.3,  
24          *Biological Goals and Objectives*).

- 25          ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at  
26          least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
27          with CM4).
- 28          ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
29          and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 30          ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
31          in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 32          ● Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands  
33          and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 34          ● Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands  
35          (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 36          ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
37          natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

38          As explained below, with the restoration and protection of these amounts of habitat, in addition to  
39          natural community enhancement and management commitments (including CM12 *Methylmercury*  
40          *Management*) and implementation of AMM1–AMM7, AMM18 *California Clapper Rail and California*  
41          *Black Rail*, and AMM27 *Selenium Management*, impacts on the California black rail would not be  
42          adverse for NEPA purposes and would be less than significant for CEQA purposes.

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**Table 12-1B-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	3	3	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Primary	76	84	0	0	0	0
	Secondary	986	3,044	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>1,062</b>	<b>3,128</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>1,062</b>	<b>3,128</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

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**Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

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Alternative 1B conservation measures would result in the combined permanent and temporary loss of up to 87 acres of modeled primary habitat and up to 3,044 acres of modeled secondary habitat for California black rail (Table 12-1B-25). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1) and tidal natural communities restoration (CM4). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate California black rail habitat. Each of these individual activities is described below. A summary statement of the combined NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

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- *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would result in the temporary loss of up to 3 acres of modeled primary California black rail habitat (Table 12-1B-25). Activities that would impact modeled habitat consist of consists of potential temporary siphon work areas at White Slough and south of King Island in CZ 5 and a proposed temporary transmission line east of the new forebay in CZ 8. The CM1 footprint intersects with one California black rail occurrence south of Sycamore Slough, from the footprint of a temporary work area. The implementation of AMM19 *California Clapper Rail and California Black Rail* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) would minimize the effects of construction on rails if present in the area. Refer to the Terrestrial Biology Map Book for a

1 detailed view of Alternative 1B construction locations. These losses would take place within the  
2 first 10 years of Alternative 1B implementation.

- 3 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage  
4 improvements associated with the Yolo Bypass would result in the permanent removal of  
5 approximately 5 acres of primary California black rail habitat in CZ 2. The loss would be  
6 expected to occur during the first 10 years of Alternative 1B implementation. There are no  
7 occurrences of California black rail that intersect with the CM2 footprint.
- 8 ● *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be  
9 affected by tidal marsh restoration. Some California black rail modeled habitat would be  
10 permanently lost such that it no longer serves as habitat, while other modeled habitat would  
11 change value through conversion from one habitat type to another. Tidal habitat restoration site  
12 preparation and inundation would result in the permanent loss of 79 acres of primary habitat  
13 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat  
14 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the  
15 species due to increased water elevations.

16 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh  
17 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches  
18 and would be replaced by larger continuous areas of tidal wetlands that are expected to support  
19 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,  
20 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least  
21 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-  
22 term would benefit California black rail. The primary habitat for the species in the Delta consists  
23 of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in  
24 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to  
25 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects  
26 would include an ecotone between wetlands and transitional uplands which would provide  
27 upland refugia for the species.

28 The tidal natural communities restoration would be phased through the course of the BDCP  
29 restoration program to allow for recovery of some areas before the initiation of restoration  
30 actions in other areas. However, California black rails have a greater use of mature tidal marshes  
31 and, therefore, it would be years before the newly restored marshes provided suitable habitat  
32 for the species. In the long-term, tidal natural communities restoration is expected to have little  
33 to no adverse effects on California black rail habitat because the habitat removed would be  
34 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a  
35 benefit for California black rail.

- 36 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
37 actions contained in CM11 that are designed to enhance wildlife values in restored and  
38 protected tidal wetland habitats may result in localized ground disturbances that could  
39 temporarily remove small amounts of California black rail habitat. Ground-disturbing activities,  
40 such as removal of nonnative vegetation and road and other infrastructure maintenance  
41 activities, are expected to have minor adverse effects on available California black rail habitat  
42 and are expected to result in overall improvements and maintenance of California black rail  
43 habitat values over the term of the BDCP. Noise and visual disturbances during implementation  
44 of habitat management actions could also result in temporary disturbances that affect California  
45 black rail use of the surrounding habitat. These effects cannot be quantified, but would be

1 avoided and minimized by the AMMs listed below. Additional actions under CM11 include the  
2 control of nonnative predators to reduce nest predation as needed.

- 3 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
4 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
5 disturbances that could affect California black rail use of the surrounding habitat in Suisun and  
6 the central Delta. Maintenance activities would include vegetation management, levee and  
7 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
8 would be reduced by AMMs and conservation actions as described below.
- 9 ● Injury and Direct Mortality: Construction vehicle activity may cause injury or mortality to  
10 California black rail. If rails are present adjacent to covered activities, the operation of  
11 equipment for land clearing, construction, conveyance facilities operation and maintenance, and  
12 habitat restoration, enhancement, and management could result in injury or mortality of  
13 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to  
14 a higher incidence of road kill. However, conducting construction outside of the breeding season  
15 where feasible (reducing the risk of impacting active nests), construction monitoring, and other  
16 measures would be implemented to avoid and minimize injury or mortality of the species during  
17 construction, as required by AMM1–AMM7 and *AMM19 California Clapper Rail and California*  
18 *Black Rail* listed below.

19 The following paragraphs summarize the combined effects discussed above and describe other  
20 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
21 included.

### 22 ***Near-Term Timeframe***

23 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
24 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
25 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
26 effects of construction would not be adverse under NEPA. With Alternative 1B implementation,  
27 there would be a loss of 1,065 acres of modeled habitat for California black rail in the study area in  
28 the near-term. These effects would result from the construction of the water conveyance facilities  
29 (CM1, 3 acres of primary habitat), and implementing other conservation measures (*CM2 Yolo Bypass*  
30 *Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*—76 acres of primary  
31 habitat, 986 acres of secondary habitat).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
33 be affected and that are identified in the biological goals and objectives for California black rail in  
34 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
35 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
36 Using this ratio would indicate that 3 acres of tidal natural communities should be restored/created  
37 to compensate for the CM1 losses of California black rail habitat. The near-term effects of other  
38 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring  
39 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio  
40 (1:1 for restoration).

41 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
42 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in  
43 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and

1 would occur in the same timeframe as the construction and early restoration losses, thereby  
2 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland  
3 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun  
4 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective  
5 TBEWNC1.1, BDCP Chapter 3, *Conservation Strategy*) and the tidal freshwater emergent wetland  
6 would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition,  
7 tidal brackish and tidal freshwater emergent wetlands would be restored in a way that creates  
8 topographic heterogeneity and in areas that increase connectivity among protected lands  
9 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland  
10 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of  
11 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists  
12 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-  
13 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent  
14 performance standards for considering the effectiveness of CM4 restoration actions. The acres of  
15 restoration and protection contained in the near-term Plan goals and the additional detail in the  
16 biological objectives for California black rail satisfy the typical mitigation that would be applied to  
17 the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation  
18 measures.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
24 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
25 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
26 3.C, *Avoidance and Minimization Measures*.

### 27 **Late Long-Term Timeframe**

28 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
29 habitat for California black rail. Alternative 1B as a whole would result in the permanent loss of and  
30 temporary effects on 87 acres of primary habitat and 3,044 acres of secondary habitat for California  
31 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of  
32 the total secondary habitat in the study area). The locations of these losses are described above in  
33 the analyses of individual conservation measures. The Plan includes conservation commitments  
34 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal  
35 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal  
36 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These tidal  
37 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches,  
38 and at least 1,500 acres of restored marsh would consist of middle-and high-marsh vegetation with  
39 dense, tall stands of pickleweed and bulrush cover serving as primary habitat for California black  
40 rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for  
41 California black rail would be created between the restored tidal freshwater emergent wetlands and  
42 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and  
43 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of  
44 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through  
45 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
46 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as



1 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional  
2 pressures on the species such as loss of habitat from invasive species and mortality from nest  
3 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes  
4 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more  
5 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11  
6 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
7 necessary through *CM11 Natural Communities Enhancement and Management*.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
9 *Plant Species*) estimates that the restoration and protection actions discussed above would result in  
10 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for  
11 California black rail and the protection of 275 acres of secondary habitat for the species.

12 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-  
13 status species under Alternative 1B would represent an adverse effect in the absence of other  
14 conservation actions. However, with habitat protection and restoration associated with CM4, guided  
15 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2*  
16 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
17 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail,*  
20 which would be in place throughout the construction period, the effects of Alternative 1B as a whole  
21 on California black rail would not be adverse under NEPA.

## 22 **CEQA Conclusion:**

### 23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would be less than significant under CEQA. With Alternative 1B  
28 implementation, there would be a loss of 1,065 acres of modeled habitat for California black rail in  
29 the study area in the near-term. These effects would result from the construction of the water  
30 conveyance facilities (CM1, 3 acres of primary habitat), and implementing other conservation  
31 measures (*CM2 Yolo Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration-*  
32 *76 acres of primary habitat, 986 acres of secondary habitat*).

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
34 be affected and that are identified in the biological goals and objectives for California black rail in  
35 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
36 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
37 Using this ratio would indicate that 3 acres of tidal natural communities should be restored/created  
38 to mitigate the CM1 losses of California black rail habitat. The near-term effects of other  
39 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring  
40 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio  
41 (1:1 for restoration).

42 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
43 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in

1 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and  
2 would occur in the same timeframe as the construction and early restoration losses, thereby  
3 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland  
4 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun  
5 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective  
6 TBEWNC1.1) and the tidal freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5,  
7 CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent  
8 wetlands would be restored in a way that creates topographic heterogeneity and in areas that  
9 increase connectivity among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of  
10 the 4,800 acres of managed wetland protected and enhanced in CZ 11 would benefit the California  
11 black rail through the enhancement of degraded areas (such as areas of bare ground or marsh where  
12 the predominant vegetation consists of invasive species such as perennial pepperweed) to  
13 vegetation such as pickleweed-alkali heath-American bulrush plant associations (Objective  
14 MWNC1.1). These Plan objectives represent performance standards for considering the  
15 effectiveness of CM4 restoration actions.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
21 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
22 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
23 3.C, *Avoidance and Minimization Measures*.

24 The natural community restoration and protection activities would be concluded in the first 10  
25 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
26 constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
27 *California Black Rail* and *AMM1–AMM7* would avoid and minimize potential impacts on the species  
28 from construction-related habitat loss and noise and disturbance. Because the number of acres  
29 required to meet the typical mitigation ratio described above would be only 3,608 acres of  
30 restored/created tidal natural communities, the 10,850 acres of tidal brackish and tidal freshwater  
31 emergent wetland restoration and the 4,100 acres of managed wetland protection and enhancement  
32 contained in the near-term Plan goals, and the additional detail in the biological objectives for  
33 California black rail, are more than sufficient to support the conclusion that the near-term impacts of  
34 habitat loss and direct mortality under Alternative 1B would be less than significant under CEQA.

### 35 ***Late Long-Term Timeframe***

36 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
37 habitat for California black rail. Alternative 1B as a whole would result in the permanent loss of and  
38 temporary effects on 87 acres of primary habitat and 3,044 acres of secondary habitat for California  
39 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of  
40 the total secondary habitat in the study area). The locations of these losses are described above in  
41 the analyses of individual conservation measures. The Plan includes conservation commitments  
42 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal  
43 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal  
44 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal wetlands would  
45 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the

1 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of  
2 pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun Marsh  
3 (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California black rail  
4 would be created between the restored tidal freshwater emergent wetlands and transitional  
5 uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and CBR1.1).  
6 Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of *CM3*  
7 *Natural Communities Protection and Restoration* would benefit the California black rail through the  
8 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
9 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
10 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional  
11 pressures on the species such as loss of habitat from invasive species and mortality from nest  
12 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes  
13 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more  
14 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11  
15 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
16 necessary through *CM11 Natural Communities Enhancement and Management*.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
21 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
22 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
23 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
24 3.C, *Avoidance and Minimization Measures*.

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
26 *Plant Species*) estimates that the restoration and protection actions discussed above would result in  
27 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for  
28 California black rail and the protection of 275 acres of secondary habitat for the species.

29 Considering these protection and restoration provisions, which would provide acreages of new or  
30 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
31 and restoration activities, loss of habitat or direct mortality through implementation of Alternative  
32 1B would not result in a substantial adverse effect through habitat modifications and would not  
33 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
34 would have a less-than-significant impact on California black rail.

### 35 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 36 **Facilities**

37 New transmission lines would increase the risk for bird-power line strikes, which could result in  
38 injury or mortality of California black rail. Black rails are known to suffer mortality from  
39 transmission line collision, likely associated with migration and flights between foraging areas  
40 (Eddleman et al 1994). Due to their wing shape and body size, rails have low to moderate flight  
41 maneuverability (Bevanger 1998), increasing susceptibility to collision mortality. However, there  
42 are relatively few records of California black rail collisions with overhead wires. California black  
43 rails exhibit daytime site fidelity and a lack of long-distance night migration, two factors which are  
44 associated with low collision risk in avian species (Eddleman et al. 1994). California black rail

1 movements in the study area are likely short, seasonal, and at low altitudes, typically less than 16  
2 feet (5 meters) (Eddleman et al 1994). While the species may have low to moderate flight  
3 maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting and foraging,  
4 solitary, no flocking, secretive) reduces potential exposure to overhead wires and vulnerability to  
5 collision mortality (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
6 *Proposed BDCP Powerlines*).

7 Transmission line poles and towers also provide perching substrate for raptors, which could result  
8 in increased predation pressure on local black rails. Little is currently known about the seasonal  
9 movements of black rails or the potential for increased predation on rails near power poles.  
10 However, transmission facilities are expected to have few adverse effects on the black rail  
11 population.

12 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
13 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight  
14 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike  
15 diverters on all new powerlines and select existing powerlines, which would further minimize risk  
16 of bird strike for California black rails in the Delta. Transmission line structures could increase  
17 predation on local black rails by providing perching structures for raptors. However, these effects on  
18 the California black rail population are not expected to be adverse.

19 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
20 significant impact on California black rail because the risk of bird strike is considered to be minimal  
21 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the  
22 commitment to place bird strike diverters on all new powerlines and select existing powerlines,  
23 which would further minimize risk of bird strike for California black rails in the Delta. Transmission  
24 line structures could increase predation on local black rails by providing perching structures for  
25 raptors. However, these impacts on the California black rail population are expected to be less than  
26 significant.

### 27 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

28 **Indirect construction-related effects:** Both primary and secondary habitat for California black rail  
29 within the vicinity of proposed construction areas could be indirectly affected by construction  
30 activities. Indirect effects associated with construction include noise, dust, and visual disturbance  
31 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
32 footprint but within 500 feet from the construction edge. Construction noise above background  
33 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
34 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
35 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
36 the extent to which these noise levels could affect California black rail. The use of mechanical  
37 equipment during water conveyance facilities construction could cause the accidental release of  
38 petroleum or other contaminants that could affect California black rail in the surrounding habitat.  
39 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat  
40 could also affect the species.

41 If construction occurs during the nesting season, these indirect effects could result in the loss or  
42 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment  
43 in AMM19 (as described in BDCP Appendix 3.C, *Avoidance and Minimization Measures*) that  
44 preconstruction surveys of potential breeding habitat would be conducted within 700 feet of project

1 activities, and a 500-foot no-disturbance buffer would be established around any territorial call-  
2 centers during the breeding season. In addition, construction would be avoided altogether if  
3 breeding territories cannot be accurately delimited.

4 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
5 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
6 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
7 would generally increase as a result of water operations and operations of salinity-control gates to  
8 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
9 plant communities tolerant of more brackish environments, which should be beneficial to California  
10 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

11 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
12 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
13 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
14 tidal marshes and flood plains. Thus, BDCP restoration activities that create newly inundated areas  
15 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
16 restoration). Increased methylmercury associated with natural community and floodplain  
17 restoration may indirectly affect California black rail, via uptake in lower trophic levels (as described  
18 in the BDCP, Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated  
19 with high tidal marshes that experience intermittent wetting and drying and associated anoxic  
20 conditions (Alpers et al. 2008). The potential mobilization or creation of methylmercury within the  
21 study area varies with site-specific conditions and would need to be assessed at the project level.  
22 *CM12 Methylmercury Management* contains provisions for project-specific Mercury Management  
23 Plans. Along with avoidance and minimization measures and adaptive management and monitoring,  
24 CM12 is expected to reduce the effects of methylmercury resulting from BDCP natural communities  
25 and floodplain restoration on California black rail.

26 Concentrations of methylmercury known to cause reproductive effects in birds have been found in  
27 blood and feather samples of San Francisco Bay black rails (Tsao et al. 2009). Because they forage  
28 directly in contaminated sediments, California black rails may be especially prone to methylmercury  
29 contamination. Currently, it is unknown how much of the sediment-derived methylmercury enters  
30 the food chain in Suisun Marsh or what tissue concentrations are actually harmful to the California  
31 black rail. Although tidal habitat restoration might increase methylation of mercury export to other  
32 habitats, it is unlikely to increase the exposure of methylmercury to California black rail, as they  
33 currently reside in tidal marshes in the Delta and the San Francisco Bay, where elevated  
34 methylmercury levels exist. Sites-specific restoration plans that address the creation and  
35 mobilization of mercury, as well as monitoring and adaptive management as described in CM12  
36 would address the uncertainty of methylmercury levels in restored tidal marsh.

37 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
38 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
39 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
40 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
41 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
42 classes within a species. In addition, the effect of selenium on a species can be confounded by  
43 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
44 2009).

1 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
2 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
3 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
4 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
5 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
6 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
7 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
8 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
9 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
10 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
11 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
12 levels of selenium have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
15 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal  
16 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
17 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
18 restoration activities that create newly inundated areas could increase bioavailability of selenium  
19 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
20 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
21 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
22 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
23 difficult to determine whether the effects of potential increases in selenium bioavailability  
24 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse  
25 effects on California black rail.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a  
27 substantial effect on California black rail from increases in selenium associated with restoration  
28 activities. This effect would be addressed through the implementation of AMM27, *Selenium*  
29 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
30 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
31 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
32 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
33 separately for each restoration effort as part of design and implementation. This avoidance and  
34 minimization measure would be implemented as part of the tidal habitat restoration design  
35 schedule.

36 **NEPA Effects:** Potential effects of noise and visual disturbances on California black rail would be  
37 minimized with AMM19 *California Clapper Rail and California Black Rail*. AMM1–AMM7, including  
38 AMM2 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
39 spills from occurring and ensure that measures were in place to prevent runoff from the  
40 construction area and to avoid negative effects of dust on the species. Implementation of  
41 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
42 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
43 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
44 California black rail to selenium. This effect would be addressed through the implementation of  
45 AMM27 *Selenium Management*, which would provide specific tidal habitat restoration design  
46 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal

1 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
2 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 1B  
3 implementation would not have an adverse effect on California black rail. Tidal habitat restoration is  
4 unlikely to have a significant impact on California black rail through increased exposure to  
5 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
6 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
7 the potential for increased exposure varies substantially within the study area. Site-specific  
8 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
9 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
10 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
11 assess the potential for risk of methylmercury exposure for California black rail, once site specific  
12 sampling and other information could be developed.

13 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other  
14 conservation measures could disturb primary and secondary California black rail habitat adjacent to  
15 work sites. *AMM19 California Clapper Rail and California Black Rail* would avoid and minimize  
16 impacts on California black rail from noise and visual disturbance. The use of mechanical equipment  
17 during water conveyance facilities construction could cause the accidental release of petroleum or  
18 other contaminants that could affect California black rail in the surrounding habitat. The inadvertent  
19 discharge of sediment or excessive dust adjacent to California black rail habitat could also affect the  
20 species. These impacts on California black rail would be less than significant with the incorporation  
21 of *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, into the  
22 BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates, and  
23 tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
24 gradient changes should have a beneficial impact on California black rail through the establishment  
25 of tidal marsh similar to historic conditions. Tidal habitat restoration is unlikely to have a significant  
26 impact on California black rail through increased exposure to methylmercury, as rails currently  
27 reside in tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
28 concentrations of methylmercury are harmful to the species. Site-specific restoration plans in  
29 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
30 would address the uncertainty of methylmercury levels in restored tidal marsh. Tidal habitat  
31 restoration could result in increased exposure of California black rail to selenium. This effect would  
32 be addressed through the implementation of *AMM27 Selenium Management*, which would provide  
33 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
34 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of plan  
35 implementation would have a less-than-significant impact on California black rail.

### 36 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation** 37 **Component Implementation**

38 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
39 temporary barriers to California black rail movements. Grading, filling, contouring and other initial  
40 ground-disturbing activities could remove habitat along movement corridors used by individuals  
41 and could temporarily reduce access to adjacent habitat areas. The temporary adverse effects of  
42 fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration  
43 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*  
44 *Natural Community Restoration* activities. The tidal natural communities restoration would be  
45 phased through the course of the BDCP restoration program to allow for recovery of some areas

1 before restoration actions are initiated in other areas. In addition, *AMM19 California Clapper Rail*  
2 *and California Black Rail* would avoid and minimize effects on California black rail.

3 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
4 movement would not represent an adverse effect on California black rail as a result of habitat  
5 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would  
6 be phased to allow for the recovery of some areas before restoration actions are initiated in other  
7 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
8 minimize effects on California black rail.

9 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
10 movement would represent a less-than-significant impact on California black rail as a result of  
11 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*  
12 would be phased to allow for the recovery of some areas before restoration actions are initiated in  
13 other areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
14 minimize impacts on California black rail.

### 15 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of** 16 **Implementation of Conservation Components**

17 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the  
18 periodic inundation of modeled habitat for California black rail. There are no records for California  
19 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the  
20 area has been surveyed for California black rails is unknown. Therefore, there is potential for the  
21 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration  
22 activities are completed. However, periodic inundation would not result in permanent habitat loss  
23 and would not prevent use of the bypass by current or future rail populations.

24 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
25 construction of setback levees could result in increased magnitude, frequency and duration of  
26 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of  
27 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting  
28 California black rail are considered to be low, and would not be expected to result in adverse effects  
29 on the species.

30 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
31 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California  
32 black rail as a result of habitat modification of a special-status species because periodic inundation  
33 would not result in permanent habitat loss and would not prevent use of the bypass by current or  
34 future rail populations. The risk of changes in inundation frequency and duration through CM2 and  
35 CM5 affecting California black rail is considered to be low.

36 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
37 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on  
38 California black rail because periodic inundation would not result in permanent habitat loss and  
39 would not prevent use of the bypass by current or future rail populations. The risk of changes in  
40 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is  
41 considered to be low



1       **California Clapper Rail**

2       This section describes the effects of Alternative 1B, including water conveyance facilities  
3       construction and implementation of other conservation components, on California clapper rail.  
4       California clapper rail habitat includes mostly middle marsh habitat with select emergent wetland  
5       plant alliances. Secondary habitats generally provide only a few ecological functions such as foraging  
6       (low marsh) or high-tide refuge (upland transition zones), while primary habitats provide multiple  
7       functions including breeding, effective predator cover, and forage. Further details regarding the  
8       habitat model, including assumptions on which the model is based, are provided in Appendix 2.A,  
9       *Covered Species Accounts*.

10       Construction and restoration associated with Alternative 1B conservation measures would result in  
11       both temporary and permanent losses of California clapper rail modeled habitat as indicated in  
12       Table 12-1B-26. Full implementation of Alternative 1B would also include the following  
13       conservation actions over the term of the BDCP to benefit the California clapper rail (BDCP Chapter  
14       3, Section 3.3, *Biological Goals and Objectives*).

- 15       • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
16       least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
17       with CM4).

18       As explained below, with the restoration and protection of these amounts of habitat, in addition to  
19       natural community enhancement and management commitments (including *CM12 Methylmercury*  
20       *Management*) and implementation of AMM1–AMM7, AMM18 *California Clapper Rail and California*  
21       *Black Rail*, and AMM27 *Selenium Management*, impacts on the California clapper rail would not be  
22       adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-26. Changes to California Clapper Rail Modeled Habitat Associated with Alternative**  
2 **1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Primary	26	27	0	0	0	0
	Secondary	50	50	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**  
5 **Rail**

6 Alternative 1B conservation measures would result in the total loss or conversion of up to 35 acres  
7 of modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary  
8 habitat (Table 12-1B-26). The conservation measure that would result in these losses is *CM4 Tidal*  
9 *Natural Communities Restoration*. Habitat enhancement and management activities (CM11), which  
10 include ground disturbance or removal of nonnative vegetation, could also result in local adverse  
11 habitat effects. Each of these individual activities is described below. A summary statement of the  
12 combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation  
13 measure discussions.

- 14 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert  
15 approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,  
16 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh  
17 restoration action would not result in the permanent loss of any California clapper rail habitat in  
18 the study area. However, approximately 27 acres of primary habitat would be converted to  
19 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or  
20 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal  
21 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,  
22 interconnected, and biologically diverse patches that supported a natural gradient extending  
23 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would  
24 meet the primary habitat requirements of the California clapper rail, including development of  
25 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would

1 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and  
2 habitat fragmentation.

- 3 ● *CM11 Natural Communities Enhancement and Management*: Because the entire California  
4 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement  
5 and restoration actions would be expected to benefit the species by creating the potential for  
6 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail  
7 habitat would be monitored to determine if there is a need for predator control actions. If  
8 implemented, nonnative predators would be controlled as needed to reduce nest predation and  
9 to help maintain species abundance. A variety of habitat management actions included in *CM11*  
10 *Natural Communities Enhancement and Management* that are designed to enhance wildlife  
11 values in restored and protected tidal wetland habitats could result in localized ground  
12 disturbances that could temporarily remove small amounts of California clapper rail habitat.  
13 Ground-disturbing activities, such as removal of nonnative vegetation and road and other  
14 infrastructure maintenance activities, would be expected to have minor adverse effects on  
15 available California clapper rail habitat. These potential effects are currently not quantifiable,  
16 but would be minimized with implementation *AMM19, Clapper Rail and California Black Rail*  
17 (BDCP Appendix 3.C, *Avoidance and Minimization Measures*).
- 18 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
19 infrastructure could result in ongoing but periodic disturbances that could affect California  
20 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include  
21 vegetation management, and levee repair. These effects, however, would be reduced by AMMs  
22 and conservation actions as described below.
- 23 ● *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to  
24 California black rail. If rails are present adjacent to covered activities, the operation of  
25 equipment for land clearing, and habitat restoration, enhancement, and management could  
26 result in injury or mortality of California clapper rail. Operation of construction equipment could  
27 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and  
28 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the  
29 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals  
30 are expected to avoid contact with construction equipment. However, nest sites would be  
31 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*  
32 *Rail and California Black Rail*.

33 The following paragraphs summarize the combined effects discussed above and describe other  
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
35 included.

### 36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
40 effects of construction would not be adverse under NEPA. There would be no impacts resulting from  
41 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76  
42 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects  
43 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary  
44 and 50 acres of secondary habitat).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
2 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
3 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
4 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
5 restored/created to compensate for the CM4 losses of California clapper rail habitat.

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
7 wetland in the Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with  
8 CM4 and would occur in the same timeframe as the early restoration losses, thereby avoiding  
9 adverse effects on California clapper rail. The tidal brackish emergent wetland would be restored in  
10 CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough  
11 Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1) and  
12 would be restored in a way that creates topographic heterogeneity and in areas that increase  
13 connectivity among protected lands (Objectives TBEWNC1.4). These biological goals and objectives  
14 would inform the near-term restoration efforts and represent performance standards for  
15 considering the effectiveness of restoration actions. These Plan objectives represent performance  
16 standards for considering the effectiveness of CM4 restoration actions. The acres of restoration  
17 contained in the near-term Plan goals satisfy the typical mitigation that would be applied to the  
18 near-term effects of tidal restoration.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
24 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
25 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
26 3.C, *Avoidance and Minimization Measures*.

### 27 ***Late Long-Term Timeframe***

28 The habitat model indicates that the study area supports approximately 296 acres of primary and  
29 6,420 acres of secondary habitat for California clapper rail. Alternative 1B as a whole would result in  
30 the permanent loss of and temporary effects on 27 acres of primary habitat and 50 acres of  
31 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary  
32 habitat in the study area and less than 1% of the total secondary habitat in the study area). The  
33 locations of these losses are described above in the analyses of individual conservation measures.  
34 The Plan includes a commitments through *CM4 Tidal Natural Communities Restoration* to restore or  
35 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun  
36 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,  
37 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh  
38 would consist of middle-and high-marsh vegetation, serving as primary habitat for California  
39 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the  
40 species such as loss of habitat from invasive species and mortality from nest predators would also  
41 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail  
42 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish  
43 emergent wetland natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative  
44 predators would be controlled to reduce nest predation if necessary through *CM11 Natural*  
45 *Communities Enhancement and Management*.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, *Effects Analysis*) estimates that the  
2 restoration and protection actions discussed above, would result in the restoration of 1,500 acres of  
3 primary habitat and 4,500 acres of secondary habitat for California clapper rail.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
9 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
10 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
11 3.C, *Avoidance and Minimization Measures*.

12 **NEPA Effects:** The loss of California clapper rail habitat associated with Alternative 1B would  
13 represent an adverse effect as a result of habitat modification of a special-status species and  
14 potential for direct mortality in the absence of other conservation actions. However, with habitat  
15 protection and restoration associated with CM4, guided by biological goals and objectives and by  
16 *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*,  
17 *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*  
18 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable*  
19 *Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper*  
20 *Rail and California Black Rail*, which would be in place throughout the construction period, the  
21 effects of Alternative 1B as a whole on clapper rail would not be adverse under NEPA.

## 22 **CEQA Conclusion:**

### 23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would be less than significant under CEQA. There would be no impacts  
28 resulting from the construction of the water conveyance facilities (CM1). However, there would be a  
29 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from  
30 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres  
31 of secondary habitat).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
33 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
34 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
35 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
36 restored/created to mitigate the CM4 losses of California clapper rail habitat.

37 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
38 wetland in the study area. These conservation actions are associated with CM4 and would occur in  
39 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California  
40 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western  
41 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse  
42 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that

1 creates topographic heterogeneity and in areas that increase connectivity among protected lands  
2 (Objectives TBEWNC1.4).

3 These biological goals and objectives would inform the near-term restoration efforts and represent  
4 performance standards for considering the effectiveness of restoration actions. These Plan  
5 objectives represent performance standards for considering the effectiveness of CM4 restoration  
6 actions.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail.*  
12 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
13 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
14 3.C, *Avoidance and Minimization Measures.*

15 The natural community restoration and protection activities would be concluded in the first 10  
16 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts  
17 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
18 *California Black Rail* and AMM1–AMM7 would avoid and minimize potential impacts on the species  
19 from construction-related habitat loss and noise and disturbance. Because the number of acres  
20 required to meet the typical mitigation ratio described above would be only 76 acres of restored  
21 tidal natural communities, the 2,000 acres of tidal brackish emergent wetland restoration contained  
22 in the near-term Plan goals, and the additional detail in the biological objectives for California  
23 clapper rail, are more than sufficient to support the conclusion that the near-term impacts of habitat  
24 loss and direct mortality under Alternative 1B would be less than significant under CEQA.

### 25 ***Late Long-Term Timeframe***

26 The habitat model indicates that the study area supports approximately 296 acres of primary and  
27 6,420 acres of secondary habitat for California clapper rail. Alternative 1B as a whole would result in  
28 the permanent loss of and temporary effects on 27 acres of primary habitat and 8 acres of secondary  
29 habitat for California clapper rail during the term of the Plan (9% of the total primary habitat in the  
30 study area and less than 1% of the total secondary habitat in the study area). The locations of these  
31 losses are described above in the analyses of individual conservation measures. The Plan includes a  
32 commitment to restore or create at least 6,000 acres of tidal brackish emergent wetlands for  
33 California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would  
34 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the  
35 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of  
36 pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective TBEWNC1.1).  
37 Additional pressures on the species such as loss of habitat from invasive species and mortality from  
38 nest predators would also be addressed through the BDCP. Perennial pepperweed, which  
39 outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more than  
40 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective  
41 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
42 necessary through *CM11 Natural Communities Enhancement and Management.*

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
44 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in

1 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California  
2 clapper rail.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
8 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
9 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
10 3.C, *Avoidance and Minimization Measures*.

11 Considering these protection and restoration provisions, which would provide acreages of new or  
12 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
13 and restoration activities, loss of habitat or direct mortality through implementation of Alternative  
14 1B would not result in a substantial adverse effect through habitat modifications and would not  
15 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
16 would have a less-than-significant impact on California clapper rail.

### 17 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

18 **Indirect construction-related effects:** California clapper rail habitat within the vicinity of  
19 proposed restoration areas could be indirectly affected by construction activities. Indirect effects  
20 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
21 contouring, and other ground-disturbing operations outside the project footprint but within 500  
22 feet from the construction edge. Construction noise above background noise levels (greater than 50  
23 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
24 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
25 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
26 levels could affect California clapper rail. The use of mechanical equipment during construction-  
27 related restoration activities could cause the accidental release of petroleum or other contaminants  
28 that could affect clapper rail in the surrounding habitat. The inadvertent discharge of sediment or  
29 excessive dust adjacent to California clapper rail habitat could also affect the species. If construction  
30 occurs during the nesting season, these indirect effects could result in the loss or abandonment of  
31 nests, and mortality of any eggs and/or nestlings. However, there is a commitment in *AMM19*  
32 *California Clapper Rail and California Black Rail* (as described in BDCP Appendix 3.C, *Avoidance and*  
33 *Minimization Measures*) that preconstruction surveys of potential breeding habitat would be  
34 conducted within 500 feet of project activities, and a 500-foot no-disturbance buffer would be  
35 established around any territorial call-centers during the breeding season. In addition, construction  
36 would be avoided altogether if breeding territories cannot be accurately delimited.

37 Preconstruction surveys conducted under *AMM19 California Clapper Rail and California Black Rail*  
38 would ensure construction-related noise and visual disturbances would not have an adverse effect  
39 on California clapper rail. AMM1–AMM7, including *AMM2 Construction Best Management Practices*  
40 *and Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures  
41 were in place to prevent runoff from the construction area and to avoid negative effects of dust on  
42 the species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*  
43 *and California Black Rail*, there would be no adverse effect on California black rail.

1 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
2 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
3 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
4 would generally increase as a result of water operations and operations of salinity-control gates to  
5 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
6 plant communities tolerant of more brackish environments, which would be beneficial to California  
7 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

8 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration also have the  
9 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
10 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
11 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
12 inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
13 *Strategy*, for details of restoration). Concentrations of methylmercury known to be toxic to bird  
14 embryos have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and  
15 Adelsbach 2003). In general, the highest methylation rates are associated with high tidal marshes  
16 that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al.  
17 2008). Currently, it is unknown how much of the sediment-derived methylmercury enters the food  
18 chain in Suisun Marsh or what tissue concentrations are actually harmful to the California clapper  
19 rail. However, although tidal habitat restoration might increase methylation of mercury export to  
20 other habitats, it is unlikely to significantly increase the exposure of methylmercury to California  
21 clapper rails, as they currently reside in tidal marshes where elevated methylmercury levels exist.  
22 *CM12 Methylmercury Management* includes project-specific management plans including monitoring  
23 and adaptive management to address the uncertainty of methylmercury levels in restored tidal  
24 marsh.

25 **Selenium Exposure: Selenium:** Selenium is an essential nutrient for avian species and has a  
26 beneficial effect in low doses. However, higher concentrations can be toxic (Ackerman and Eagles-  
27 Smith 2009, Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks,  
28 and adults, and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf  
29 and Heinz 2009). The effect of selenium toxicity differs widely between species and also between  
30 age and sex classes within a species. In addition, the effect of selenium on a species can be  
31 confounded by interactions with the effects of other contaminants such as mercury (Ackerman and  
32 Eagles-Smith 2009).

33 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
34 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
35 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
36 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
37 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
38 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
39 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
40 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
41 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
42 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
43 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
44 levels of selenium have a higher risk of selenium toxicity.



1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
3 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh  
4 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
5 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
6 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
7 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
8 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
9 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
10 long-term increases in selenium concentrations in water in the Delta under any alternative.  
11 However, it is difficult to determine whether the effects of potential increases in selenium  
12 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
13 lead to adverse effects on California clapper rail.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a  
15 substantial effect on California clapper rail from increases in selenium associated with restoration  
16 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
17 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
18 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
19 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
20 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
21 separately for each restoration effort as part of design and implementation. This avoidance and  
22 minimization measure would be implemented as part of the tidal habitat restoration design  
23 schedule.

24 **NEPA Effects:** Potential effects of noise and visual disturbances on California clapper rail would be  
25 minimized with *AMM19 California Clapper Rail and California Black Rail*. *AMM1–AMM7*, including  
26 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
27 spills from occurring and ensure that measures were in place to prevent runoff from the  
28 construction area and to avoid negative effects of dust on the species. Implementation of  
29 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
30 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
31 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
32 California clapper rail to selenium. This effect would be addressed through the implementation of  
33 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
34 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
35 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
36 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 1B  
37 implementation would not have an adverse effect on California clapper rail. Tidal habitat restoration  
38 is unlikely to have an adverse effect on California clapper rail through increased exposure to  
39 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
40 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
41 the potential for increased exposure varies substantially within the study area. Site-specific  
42 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
43 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
44 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
45 assess the potential for risk of methylmercury exposure for California clapper rail, once site specific  
46 sampling and other information could be developed.

1 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the  
2 CMs could disturb California clapper rail habitat adjacent to work sites. *AMM19 California Clapper*  
3 *Rail and California Black Rail* would avoid and minimize impacts on California clapper rail from  
4 noise and visual disturbance. The use of mechanical equipment during water conveyance facilities  
5 construction could cause the accidental release of petroleum or other contaminants that could affect  
6 California clapper rail in the surrounding habitat. The inadvertent discharge of sediment or  
7 excessive dust adjacent to California clapper rail habitat could also affect the species. These impacts  
8 on California clapper rail would be less than significant with the incorporation of AMM1–AMM7 into  
9 the BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates,  
10 and tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
11 gradient changes should have a beneficial impact on California clapper rail through the  
12 establishment of tidal marsh similar to historic conditions. Although tidal habitat restoration might  
13 increase methylation of mercury export to other habitats, it is unlikely to significantly increase the  
14 exposure of methylmercury to California clapper rail, as they currently reside in tidal marshes in the  
15 San Francisco Bay, where elevated methylmercury levels exist. It is unknown what concentrations of  
16 methylmercury are harmful to the species. *CM12 Methylmercury Management* includes project-  
17 specific management plans including monitoring and adaptive management to address the  
18 uncertainty of methylmercury levels in restored tidal marsh. Tidal habitat restoration could result in  
19 increased exposure of California clapper rail to selenium. This effect would be addressed through  
20 the implementation of *AMM27 Selenium Management* which would provide specific tidal habitat  
21 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
22 bioavailability in tidal habitats. Therefore, the indirect effects of plan implementation would have a  
23 less-than-significant impact on California clapper rail.

24 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission**  
25 **Facilities**

26 Isolated patches of suitable California clapper rail habitat may occur in the study area as far east as  
27 (but not including) Sherman Island. Home range and territory of the California clapper rail is not  
28 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to  
29 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with  
30 the proposed lines (BDCP Attachment 5).C, *Analysis of Potential Bird Collisions at Proposed BDCP*  
31 *Transmission Lines*). The location of the current population and suitable habitat for the species make  
32 collision with the proposed transmission lines highly unlikely.

33 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
34 effect on California clapper rail because the location of the current population and suitable habitat  
35 for the species would make collision with the proposed transmission lines highly unlikely.

36 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
37 significant impact on California clapper rail because the location of the current population and  
38 suitable habitat for the species would make collision with the proposed transmission lines highly  
39 unlikely.

40 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation**  
41 **Component Implementation**

42 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
43 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other

1 initial ground-disturbing activities could remove habitat along movement corridors used by  
2 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse  
3 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or  
4 restoration activities resulting in barriers to movement would be minimized through sequencing of  
5 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities  
6 restoration would be phased through the course of the BDCP restoration program to allow for  
7 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*  
8 *California Clapper Rail and California Black Rail* would avoid and minimize effects on California  
9 clapper rail.

10 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
11 movement would not represent an adverse effect on California clapper rail as a result of special-  
12 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be  
13 phased to allow for the recovery of some areas before restoration actions are initiated in other  
14 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
15 minimize effects on California clapper rail.

16 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
17 movement would represent a less-than-significant impact on California clapper rail as a result of  
18 habitat modification of a special status species because Tidal Natural Communities Restoration  
19 (CM4) would be phased to allow for the recovery of some areas before initiating restoration actions  
20 in other areas. In addition, *AMM19 California Clapper Rail and California Black Rail*  
21 would avoid and minimize effects on California clapper rail.

## 22 California Least Tern

23 This section describe the effects of Alternative 1B, including water conveyance facilities construction  
24 and implementation of other conservation components on California least tern. California least tern  
25 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the  
26 study area. Breeding habitat is not included in the model because most of the natural shoreline in  
27 the study area that historically provided nesting sites has been modified or removed.

28 Construction and restoration associated with Alternative 1B conservation measures would result in  
29 both temporary and permanent losses of California least tern modeled habitat as indicated in Table  
30 12-1B-27. Full implementation of Alternative 1B would also include the following conservation  
31 actions over the term of the BDCP to benefit California least tern (BDCP Chapter 3, Section 3.3,  
32 *Biological Goals and Objectives*).

- 33 ● Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands  
34 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 35 ● Within the at least 65,000 acres of tidal natural communities and transitional uplands, restore or  
36 create tidal perennial aquatic natural community as necessary when creating tidal emergent  
37 wetland (Objective TPANC1.1, associated with CM4).
- 38 ● Control invasive aquatic vegetation that adversely affects native fish habitat (Objective  
39 TPANC2.1, associated with CM13).

40 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of  
41 Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial

waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation).

As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat, in addition to natural community enhancement and management commitments (including CM12 *Methylmercury Management*) and implementation of AMM1–AMM7, *AMM27 Selenium Management*, and mitigation to avoid impacts on terns should they nest in the study area, impacts on the California least tern would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1B-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	33	33	145	145	NA	NA
<b>Total Impacts CM1</b>		<b>33</b>	<b>33</b>	<b>145</b>	<b>145</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	38	46	11	16	NA	NA
<b>Total Impacts CM2–CM18</b>		<b>38</b>	<b>46</b>	<b>11</b>	<b>16</b>	<b>NA</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>71</b>	<b>79</b>	<b>156</b>	<b>161</b>	<b>NA</b>	<b>NA</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

Alternative 1B conservation measures would result in the combined permanent and temporary loss of up to 215 acres of modeled foraging habitat for California least tern (Table 12-1B-27). The conservation measures that would result in these losses are construction of water conveyance facilities and operation (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate California least tern foraging habitat. Each of these individual activities is described below. A summary statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would result in the combined permanent and temporary loss of up to 178 acres of modeled California

1 least tern aquatic foraging habitat (Table 12-1B-27). Of the 178 acres of modeled habitat that  
2 would be removed for the construction of the conveyance facilities, 145 acres would be a  
3 temporary loss. Most of the permanent loss would occur where Intakes 1–5 encroach on the  
4 Sacramento River’s east bank between Freeport and Courtland. The temporary effects on  
5 California least tern habitat would occur at numerous locations, including in the Sacramento  
6 River at Intakes 1–5, and at temporary siphon construction work areas where the canal would  
7 cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough and  
8 Middle River just southeast of Victoria Canal. Tunnel work areas and transmission construction  
9 sites at the junction of the new canal and the new Byron Court Forebay would also temporarily  
10 affect foraging habitat in West Canal, Grant Line Canal and Old River just south of Clifton Court  
11 Forebay. The CM1 footprint does not overlap with any California least tern occurrences.  
12 However, Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and*  
13 *Indirect Effects on Colonies Will Be Minimized*, (described below) would be available to minimize  
14 potential effects on terns if they were to nest in or adjacent to the construction footprint. Refer  
15 to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.  
16 These losses would take place during the first 10 years of Alternative 1B implementation.

- 17 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement  
18 would result in the permanent loss of 8 acres and the temporary loss of 11 acres of modeled  
19 aquatic foraging habitat for California least tern in CZ 2. The loss would be expected to occur  
20 during the first 10 years of Alternative 1B implementation.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the  
22 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An  
23 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,  
24 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial  
25 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP  
26 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with  
27 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to  
28 substantially increase the primary productivity of fish, increasing the prey base for California  
29 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years  
30 of BDCP implementation, which would coincide with the timeframe of water conveyance  
31 facilities construction. The remaining restoration would be phased over the following 30 years.  
32 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be  
33 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 34 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
35 seasonally inundated floodplain would result in the permanent loss of 2 acres and the  
36 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This  
37 activity is scheduled to start following construction of water conveyance facilities, which is  
38 expected to take 10 years. Specific locations for the floodplain restoration have not been  
39 identified, but it is expected that much of the activity would occur in the south Delta along the  
40 major rivers.
- 41 ● *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances  
42 during implementation of habitat management actions could result in temporary disturbances  
43 that affect California least tern use of the surrounding habitat. These effects cannot be  
44 quantified, but are expected to be minimal because few management activities would be  
45 implemented in aquatic habitat and because terns are not expected to nest on protected lands.  
46 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting

1 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and  
2 injury mortality and noise and visual disturbance of nesting terns would be avoided and  
3 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies*  
4 *Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.

- 5 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
6 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
7 post construction disturbances, localized impacts on California least tern foraging habitat, and  
8 temporary noise and disturbances over the term of the BDCP. Maintenance activities would  
9 include vegetation management, levee and structure repair, and re-grading of roads and  
10 permanent work areas which could be adjacent to California least tern foraging habitat. These  
11 effects, however, would be reduced by AMMs described below.

12 Injury and Direct Mortality: California least terns currently nest in the vicinity of potential  
13 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies  
14 could establish if suitable nesting habitat is created during restoration activities (e.g., placement  
15 of unvegetated fill to raise surface elevations prior to breaching levees during restoration  
16 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment  
17 for land clearing, construction, conveyance facilities operation and maintenance, and habitat  
18 restoration, enhancement, and management could result in injury or mortality of California least  
19 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-  
20 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the  
21 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals  
22 would be expected to avoid contact with construction equipment. However, injury or mortality  
23 would be avoided through planning and preconstruction surveys to identify nesting colonies,  
24 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot  
25 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*  
26 *Avoided and Indirect Effects on Colonies Will Be Minimized*.

27 The following paragraphs summarize the combined effects discussed above, describe other BDCP  
28 conservation actions that offset or avoid these effects. NEPA and CEQA conclusions area also  
29 included.

### 30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
33 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
34 the effects of construction would not be adverse under NEPA. With Alternative 1B implementation,  
35 there would be a loss of 227 acres of modeled foraging habitat for California least tern in the study  
36 area in the near-term. These effects would result from the construction of the water conveyance  
37 facilities (CM1, 178 acres), and implementing other conservation measures (Yolo Bypass fisheries  
38 improvements [CM2], and tidal habitat restoration [CM4]—49 acres). All modeled foraging habitat  
39 impacts would occur in tidal perennial aquatic natural communities.

40 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
41 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
42 indicate that 178 acres of the tidal perennial aquatic natural community should be restored/created  
43 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of  
44 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore

1 require 49 acres of tidal perennial aquatic natural community restoration using the same typical  
2 NEPA and CEQA ratio (1:1 for restoration).

3 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
4 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3). This  
5 conservation action would result in the creation of approximately 3,400 acres of high quality tidal  
6 perennial aquatic natural community, based on modeling conducted by ESAPWA (refer to Table 5 in  
7 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic restoration  
8 would occur in the same timeframe as the construction and early restoration losses, thereby  
9 avoiding adverse effects on California least tern from loss of foraging habitat.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
15 minimize the risk of affecting individuals and species habitats at or adjacent to work areas and  
16 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
17 *Measures*.

18 The California least tern is not a species that is covered under the BDCP. Although nesting by  
19 California least tern is not expected to occur, restoration sites could attract individuals wherever  
20 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly  
21 substrates with sparse vegetation). If nesting were to occur, construction activities could have an  
22 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*  
23 *Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would be available to  
24 address this effect on nesting California least terns.

### 25 **Late Long-Term Timeframe**

26 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
27 habitat for California least tern. Alternative 1B as a whole would result in the permanent loss of and  
28 temporary effects on 240 acres of foraging habitat during the term of the Plan (less than 1% of the  
29 total habitat in the study area). The locations of these losses are described above in the analyses of  
30 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
31 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal  
32 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix  
33 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of  
34 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South  
35 Delta ROAs (see Figure 12-1).

36 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality  
37 associated with Alternative 1B would represent an adverse effect in the absence of other  
38 conservation actions. Although nesting by California least tern is not expected to occur in the study  
39 area, restoration sites could attract individuals wherever disturbed or artificial sites mimic habitat  
40 conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting  
41 were to occur, construction activities could have an adverse effect on California least tern. Mitigation  
42 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*  
43 *Colonies Will be Minimized*, would be available to address this effect on nesting California least terns.  
44 With habitat restoration associated with CM4 and guided by *AMM1 Worker Awareness Training*,

1 *AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution*  
2 *Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
3 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
4 *Material, and AMM7 Barge Operations Plan, which would be in place throughout the construction*  
5 *period, the effects of Alternative 1B as a whole on California least tern would not be adverse under*  
6 *NEPA.*

7 ***CEQA Conclusion:***

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
10 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
11 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
12 the effects of construction would be less than significant under CEQA. With Alternative 1B  
13 implementation, there would be a loss of 227 acres of modeled foraging habitat for California least  
14 tern in the study area in the near-term. These effects would result from the construction of the  
15 water conveyance facilities (CM1, 178 acres), and implementing other conservation measures (Yolo  
16 Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled  
17 foraging habitat impacts would occur in tidal perennial aquatic natural communities.

18 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
19 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
20 indicate that 178 acres of the tidal perennial aquatic natural community should be restored/created  
21 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of  
22 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore  
23 require 49 acres of tidal perennial aquatic natural community restoration using the same typical  
24 NEPA and CEQA ratio (1:1 for restoration).

25 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
26 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).  
27 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation  
28 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table  
29 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic  
30 restoration would occur in the same timeframe as the construction and early restoration losses,  
31 thereby avoiding adverse effects on California least tern.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
33 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
34 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan, AMM6 Spoils, Reusable Tunnel Material, and Dredged Material Disposal Plan,*  
36 *and AMM7 Barge Operations Plan.* All of these AMMs include elements that would avoid or minimize  
37 the risk of affecting individuals and species habitats at or adjacent to work areas and storage sites.  
38 The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures.*

39 Although nesting by California least tern is not expected to occur, restoration sites could attract  
40 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,  
41 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities  
42 could have an adverse effect on California least tern. Implementation of Mitigation Measure BIO-66,



1 *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies Will Be*  
2 *Minimized*, would reduce the impact on nesting California least terns to a less-than-significant level.

3 The natural community restoration and protection activities would be concluded in the first 10  
4 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
5 constitute adequate mitigation for CEQA purposes. In addition, AMM1–AMM7 and Mitigation  
6 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*  
7 *Colonies Will Be Minimized*, would avoid and minimize potential impacts on the species from  
8 construction-related habitat loss and noise and disturbance. Because the number of acres required  
9 to meet the typical mitigation ratio described above would be only 227 acres of restored tidal  
10 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the  
11 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat  
12 loss and direct mortality under Alternative 1B would be less than significant under CEQA.

### 13 ***Late Long-Term Timeframe***

14 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
15 habitat for California least tern. Alternative 1B as a whole would result in the permanent loss of and  
16 temporary effects on 240 acres of foraging habitat during the term of the Plan (less than 1% of the  
17 total habitat in the study area). The locations of these losses are described above in the analyses of  
18 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
19 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial  
20 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*  
21 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including  
22 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure  
23 12-1).

24 The loss of California least tern foraging habitat and potential direct mortality associated with  
25 Alternative 1B would represent a significant impact in the absence of other conservation actions.  
26 However, with habitat restoration associated with CM4 and guided by *AMM1 Worker Awareness*  
27 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*  
28 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*  
29 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
30 *Material, and Dredged Material*, *AMM7 Barge Operations Plan*, which would be in place throughout  
31 the construction period, and the implementation of Mitigation Measure BIO-66, *California Least Tern*  
32 *Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, the loss of  
33 habitat or mortality under this alternative would have a less-than-significant impact on California  
34 least tern.

### 35 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and** 36 **Indirect Effects on Colonies Will Be Minimized**

37 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging  
38 habitat is identified during planning level surveys, at least three preconstruction surveys for this  
39 species will be conducted during the nesting season by a qualified biologist with experience  
40 observing the species and its nests. Projects will be designed to avoid the loss of California least  
41 tern nesting colonies. No construction will take place within 500 feet California least tern nests  
42 during the nesting season (April 15 to August 15 or as determined through surveys). Only  
43 inspection, maintenance, research, or monitoring activities may be performed during the least

1 tern breeding season in areas within or adjacent to least tern breeding habitat with USFWS and  
2 CDFW approval under the supervision of a qualified biologist.

### 3 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

4 **Indirect construction-and operation-related effects:** Indirect effects associated with  
5 construction that could affect California least tern include noise, dust, and visual disturbance caused  
6 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint  
7 but within 500 feet from the construction edge. Construction noise above background noise levels  
8 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
9 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
10 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
11 which these noise levels could affect California least tern. The use of mechanical equipment during  
12 water conveyance facilities construction could cause the accidental release of petroleum or other  
13 contaminants that could affect California least tern or their prey species in the surrounding habitat.  
14 The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also  
15 affect the species. Noise and visual disturbance is not expected to have an adverse effect on  
16 California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*  
17 *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern  
18 nests were found during planning or preconstruction surveys, no construction would take place  
19 within 500 feet of active nests. In addition, AMM1–AMM7, including construction best management  
20 practices, would minimize the likelihood of spills or excessive dust being created during  
21 construction. Should a spill occur, implementation of these AMMs would greatly reduce the  
22 likelihood of individuals being affected.

23 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation  
24 of mercury in avian species including the California least tern. The operational impacts of new flows  
25 under CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury  
26 concentration and bioavailability. Subsequently, a regression model was used to estimate fish-tissue  
27 concentrations under these future operational conditions (evaluated starting operations or ESO).  
28 Results indicated that changes in total mercury levels in water and fish tissues due to ESO were  
29 insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

30 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
31 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
32 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
33 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase  
34 bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
35 Increased methylmercury associated with natural community and floodplain restoration may  
36 indirectly affect California least tern, via uptake in lower trophic levels (as described in the BDCP,  
37 Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated with high tidal  
38 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers  
39 et al. 2008). The potential mobilization or creation of methylmercury within the Plan Area varies  
40 with site-specific conditions and would need to be assessed at the project level.

41 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting  
42 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were  
43 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from  
44 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially

1 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from  
2 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern  
3 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample  
4 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in  
5 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are  
6 representative of the population in the San Francisco Bay, they would not be expected to result in  
7 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern  
8 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

9 *CM12 Methylmercury Management* includes provisions for project-specific Mercury Management  
10 Plans. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
11 as monitoring and adaptive management as described in CM12 would be available to address the  
12 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on California  
13 least tern.

14 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
15 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
16 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
17 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
18 effect of selenium toxicity differs widely between species and also between age and sex classes  
19 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
20 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

21 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
22 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
23 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
24 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
25 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
26 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
27 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
28 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
29 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
30 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
31 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
32 levels of selenium have a higher risk of selenium toxicity.

33 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
34 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
35 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal  
36 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
37 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
38 restoration activities that create newly inundated areas could increase bioavailability of selenium  
39 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
40 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
41 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
42 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
43 difficult to determine whether the effects of potential increases in selenium bioavailability  
44 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse  
45 effects on California least tern.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a  
2 substantial effect on California least tern from increases in selenium associated with restoration  
3 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
4 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
5 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
6 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
7 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
8 separately for each restoration effort as part of design and implementation. This avoidance and  
9 minimization measure would be implemented as part of the tidal habitat restoration design  
10 schedule.

11 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from  
12 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation  
13 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
14 *Colonies Will Be Minimized*, would be available to address this effect. AMM1–AMM7, including *AMM2*  
15 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills  
16 from occurring and ensure that measures were in place to prevent runoff from the construction area  
17 and to avoid negative effects of dust on the species. Tidal habitat restoration could result in  
18 increased exposure of California least tern to selenium. This effect would be addressed through the  
19 implementation of *AMM27 Selenium Management* which would provide specific tidal habitat  
20 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
21 bioavailability in tidal habitats. The indirect effects associated with noise and visual disturbances,  
22 potential spills of hazardous material, and increased exposure to selenium from Alternative 1B  
23 implementation would not have an adverse effect on California least tern. Tidal habitat restoration  
24 could result in increased exposure of California least tern to methylmercury. However, it is unknown  
25 what concentrations of methylmercury are harmful to the species, and the potential for increased  
26 exposure varies substantially within the study area. Site-specific restoration plans that address the  
27 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
28 in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
29 methylmercury levels in restored tidal marsh and potential impacts on California least tern. The  
30 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
31 potential for risk of methylmercury exposure for California least tern, once site specific sampling  
32 and other information could be developed.

33 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities  
34 could disturb California least tern foraging habitat adjacent to work sites. Mitigation Measure BIO-  
35 66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be*  
36 *Minimized*, would avoid and minimize impacts on potential nesting California least terns from noise  
37 and visual disturbance. The use of mechanical equipment during water conveyance facilities  
38 construction could cause the accidental release of petroleum or other contaminants that could affect  
39 California least tern if present in the surrounding habitat. The inadvertent discharge of sediment or  
40 excessive dust adjacent to California least tern habitat could also affect the species. These impacts on  
41 California least tern would be less than significant with the incorporation of AMM1–AMM7 into the  
42 BDCP. Tidal habitat restoration could result in increased exposure of California least tern to  
43 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
44 species. Sites-specific restoration plans that address the creation and mobilization of mercury, as  
45 well as monitoring and adaptive management as described in *CM12 Methylmercury Management*,  
46 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and

1 potential impacts on California least tern. This effect would be addressed through the  
2 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
3 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
4 bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1B implementation  
5 would not have a significant impact on California least tern.

6 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**  
7 **Indirect Effects on Colonies Will Be Minimized**

8 See Mitigation Measure BIO-66 under Impact BIO-66.

9 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**  
10 **Facilities**

11 New transmission lines would increase the risk for bird-power line strikes, which could result in  
12 injury or mortality of California least tern. This risk is considered to be minimal based on tern flight  
13 behaviors and its unlikely use of habitats near the transmission line corridors. Transmission line  
14 poles and towers also provide perching substrate for raptors, which could result in increased  
15 predation pressure on local California least terns. This would be expected to have few adverse  
16 effects on California least terns.

17 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
18 adverse effect on California least tern as a result of direct mortality of a special-status species  
19 because they are not known to be present in areas of disturbance and because the probability of  
20 bird-powerline strikes is unlikely due to tern flight behaviors.

21 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-  
22 than-significant impact on California least tern as a result of direct mortality of a special-status  
23 species because they are not known to be present in areas of disturbance and because the  
24 probability of bird-powerline strikes is unlikely due to tern flight behaviors.

25 **Greater Sandhill Crane**

26 This section describes the effects of Alternative 1B, including water conveyance facilities  
27 construction and implementation of other conservation components, on greater sandhill crane.  
28 Greater sandhill cranes in the study area are almost entirely dependent on privately owned  
29 agricultural lands for foraging. Long-term sustainability of the species is thus dependent on  
30 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining  
31 compatible agricultural practices, while sustaining and increasing the extent of other essential  
32 habitat elements such as night roosting habitat. The habitat model for greater sandhill crane  
33 includes "roosting and foraging" and "foraging" habitat. These habitat types include certain  
34 agricultural types, specific grassland types, irrigated pastures and hay crops, managed seasonal  
35 wetland, and other natural seasonal wetland. Roosting and foraging habitat includes known,  
36 traditional roost sites that also provide foraging habitat (BDCP Appendix 2.A *Covered Species*  
37 *Accounts*). Both temporary and permanent roost sites were identified for greater Sandhill crane.  
38 Permanent roosting and foraging sites are those used regularly, year after year, while temporary  
39 roosting and foraging sites are those used in some years. Factors included in assessing the loss of  
40 foraging habitat for the greater sandhill crane includes the relative habitat value of specific crop or  
41 land cover types, and proximity to known roost sites. Foraging habitat for greater sandhill crane

1 included crop types and natural communities up to 4 miles from known roost sites, within the  
2 boundary of the winter crane use area (BDCP Appendix 2A, *Covered Species Accounts*).

3 Construction and restoration associated with Alternative 1B conservation measures would result in  
4 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as  
5 indicated in Table 12-1B-28. Full implementation of Alternative 1B would also include the following  
6 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter  
7 3, Section 3.3, *Biological Goals and Objectives*).

- 8 ● Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
9 least 80% maintained in very high-value types in any given year. This protected habitat will be  
10 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
11 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
12 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective  
13 GSHC1.1, associated with CM3).
- 14 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
15 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or  
16 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be  
17 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
18 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
19 habitat loss (Objective GSHC1.2, associated with CM3).
- 20 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
21 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
22 and local seasonal flood events. The wetlands will be located within 2 miles of existing  
23 permanent roost sites and protected in association with other protected natural community  
24 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
25 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 26 ● Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge  
27 project boundary. The complexes will be no more than 2 miles apart and will help provide  
28 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each  
29 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane  
30 roosting habitat, and will be protected in association with other protected natural community  
31 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,  
32 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
33 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
34 support roosting cranes and provide highest-value foraging habitat, provided such substitution  
35 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for  
36 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 37 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
38 sites. The habitat will consist of active cornfields that are flooded following harvest to support  
39 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least  
40 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will  
41 be sited with consideration of the location of roosting habitat loss and will be in place prior to  
42 roosting habitat loss (Objective GSHC1.5, associated with CM3).
- 43 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
44 other native wildlife species (Objective CLNC1.1, associated with CM3).

- 1 • Target cultivated land conservation to provide connectivity between other conservation lands  
2 (Objective CLNC1.2, associated with CM3).
- 3 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
4 lands that occur in cultivated lands within the reserve system, including, water conveyance  
5 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

6 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
7 natural community enhancement and management commitments (including *CM12 Methylmercury*  
8 *Management*) and implementation of AMM1–AMM7, AMM20 *Greater Sandhill Crane*, AMM27  
9 *Selenium Management*, AMM30 *Transmission Line Design and Alignment Guidelines*, and Mitigation  
10 Measures BIO-69a and BIO-69b, impacts on the greater sandhill crane would be less than significant  
11 for CEQA purposes.

12 **Table 12-1B-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 1B**  
13 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	148	148	733	733		
	Foraging	3,265	3,265	4,632	4,632	NA	NA
<b>Total Impacts CM1</b>		<b>3,413</b>	<b>3,413</b>	<b>5,365</b>	<b>5,365</b>		
CM2–CM10	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>2,776</b>	<b>4,408</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Roosting and Foraging</b>		<b>148</b>	<b>189</b>	<b>733</b>	<b>733</b>	<b>0</b>	<b>0</b>
<b>Total Foraging</b>		<b>6,041</b>	<b>7,632</b>	<b>4,632</b>	<b>4,632</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>6,189</b>	<b>7,821</b>	<b>5,365</b>	<b>5,365</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**  
2 **Crane**

3 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
4 of up to 922 acres of temporary roosting and foraging habitat (189 acres of permanent loss, 733  
5 acres of temporary loss) and 12,264 acres of foraging habitat for greater sandhill crane (7,632 acres  
6 of permanent loss, 4,632 acres of temporary loss, Table 12-1B-28). Conservation measures that  
7 would result in these losses are conveyance facilities and transmission line construction, and  
8 establishment and use of borrow and spoil areas from *CM1 Water Facilities and Operation*, *CM4 Tidal*  
9 *Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM10 Nontidal*  
10 *Marsh Restoration*, and *CM11 Natural Communities Enhancement and Management*. The majority of  
11 habitat loss would result from conversion to tidal natural communities through CM4. Habitat  
12 enhancement and management activities (CM11), which include ground disturbance or removal of  
13 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
15 facilities could degrade or eliminate greater sandhill crane modeled habitat. Each of these individual  
16 activities is described below. A summary statement of the combined impacts, NEPA effects and a  
17 CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities as they  
19 are currently designed would result in the combined permanent and temporary loss of up to  
20 8,778 acres of modeled greater sandhill crane habitat. This would consist of the permanent  
21 removal of 148 acres of roosting and foraging habitat, and 3,771 acres of foraging habitat.  
22 Foraging habitat that would be permanently impacted by CM1 would consist of 949 acres of  
23 very high-value, 566 acres of high-value, and 789 acres of medium-value foraging habitat (Table  
24 12-1B-29). In addition, 733 acres of temporary roosting and foraging habitat and 4,632 acres of  
25 foraging habitat would be temporarily removed (Table 12-1B-28). The temporarily removed  
26 habitat would consist primarily of cultivated lands and it would be restored within one year  
27 following construction. However, it would not necessarily be restored to its original topography  
28 and it could be restored as grasslands in the place of cultivated lands. CM1 activities that would  
29 result in temporary impacts would include temporary access roads, borrow and spoil sites, and  
30 work areas for construction.

31 The temporary roost sites that would be permanently impacted are located on Zaccharias  
32 Island, Shin Kee Tract, and Ringe Tract and impacts would occur from the construction of the  
33 canal and the proposed permanent transmission line footprint. Temporary impacts on  
34 temporary roosting and foraging habitat would occur from temporary work areas associated  
35 with the construction of the canal and borrow and spoil areas. Approximately 642 acres of  
36 temporary impact on temporary roosting and foraging sites would occur from the footprint of  
37 the borrow and spoil areas associated with the construction of the canal. Indirect effects of  
38 construction of the canal adjacent to Stone Lakes National Wildlife Refuge could result in the  
39 abandonment of roost sites adjacent to the CM1 footprint. Indirect effects of noise and visual  
40 disturbance are addressed under Impact BIO-71.

41 The implementation of AMM20 Greater Sandhill Crane would require that all CM1 activities be  
42 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be  
43 accomplished either by siting activities outside of identified roost sites or by relocating the roost  
44 site if it consisted of cultivated lands. Relocated roost sites would be established prior to  
45 construction activities affecting the original roost site (as described in *AMM20 Greater Sandhill*  
46 *Crane*, BDCP Appendix 3C, *Avoidance and Minimization Measures*). Therefore there would be no



1 loss of crane roosting and foraging habitat as a result of water conveyance facility construction  
2 once the facilities were fully designed.

3 Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the  
4 highest crane use areas in the Delta. Impacts on Bract Tract include the construction of the  
5 canal, proposed permanent and temporary transmission lines, potential borrow and spoil areas,  
6 and temporary work areas. Construction within or adjacent to this important crane use area  
7 would be adverse in the absence of other conservation measures. The proposed permanent  
8 transmission line alignment would occur east of The potential for injury and direct mortality  
9 from electrical transmission facilities is addressed below under Impact BIO-70. The  
10 transmission line alignment under Alternative 1B is not fully designed and the final  
11 transmission line design would be determined in coordination with USFWS, CDFW, and a  
12 qualified crane biologist to achieve a performance standard of no net increase in bird strike  
13 hazard to greater sandhill cranes in the Plan Area (*AMM20 Greater Sandhill Crane*). Mitigation  
14 Measure BIO-69b, *BDCP-Related Construction Will Not Result in a Net Decrease in Crane Use Days*  
15 *on Bract Tract*, would be available to address the effects of construction activities on or adjacent  
16 to Bract Tract.

17 Permanent and temporary impacts on foraging habitat would occur throughout the Delta from  
18 the construction of Intakes 1-5, construction of the canal, and associated borrow and spoil and  
19 RTM storage areas along the canal alignment. Approximately 3,479 acres of temporary impact  
20 on foraging habitat would result from the footprint of the borrow and spoil areas associated  
21 with the construction of the intakes and the canal. Approximately 223 acres of the permanent  
22 loss of foraging habitat would be from the storage of reusable tunnel material. This material  
23 would likely be moved to other sites for use in levee build-up and restoration, and the affected  
24 area would likely eventually be restored. While this effect is categorized as permanent because  
25 there is no assurance that the material would eventually be moved, the effect would likely be  
26 temporary. The actual footprint of the storage areas required for reusable tunnel material is  
27 flexible, and the actual acreage of habitat affected by this activity could be reduced based on the  
28 height of the storage piles in addition to other considerations. The implementation of *AMM6*  
29 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, would require that  
30 the areas used for reusable tunnel material storage be minimized in crane foraging habitat and  
31 completely avoid crane roost sites. Refer to the Terrestrial Biology Map Book for a detailed view  
32 of Alternative 1B construction locations. Impacts from CM1 would occur within the first 10  
33 years of Plan implementation.

1 **Table 12-1B-29. Total Amount of Affected Greater Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent (temporary)	Acres Affected by CM2–CM18 permanent (temporary)
Very high	Corn, rice	949 (1,845)	525 (0)
High	Alfalfa and alfalfa mixtures, mixed pasture, native pasture, wheat, other pasture, irrigated pasture, managed wetlands, native vegetation	566 (1,186)	1,732 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	789 (608)	1,018 (0)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	875 (950)	1,069 (0)
None	Vineyards, orchards	85 (43)	23 (0)

2

- 3 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration  
4 footprint, this activity would result in the permanent loss or conversion of approximately 2,754  
5 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging  
6 habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of  
7 78 acres of very high-value, 1,199 acres of high value, 855 acres of medium-value, and 558 acres  
8 of low-value foraging habitat (Table 12-1B-29). This loss would occur in the Cosumnes-  
9 Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between  
10 the high crane use areas of the central Delta and the Cosumnes River Preserve. However, the  
11 conversion of grasslands and cultivated lands to tidal wetlands would not prohibit crane  
12 movement or reduce use of these areas. In CZ 5, loss of modeled habitat would occur along the  
13 western edge of the greater sandhill crane winter use area and therefore would not result in  
14 fragmentation of traditional crane habitats. Therefore fragmentation of habitat from tidal  
15 restoration activities would be expected to be minimal. Approximately 1,951 acres of foraging  
16 habitat would be impacted within the first 10 years of Plan implementation.
- 17 • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands that  
18 provide foraging habitat for greater sandhill crane would be converted to grassland by the late  
19 long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration  
20 activities. The restored grasslands would continue to provide foraging habitat value for the  
21 greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of  
22 Plan implementation.

- 1       ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
2       conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill  
3       crane. A portion of the restored nontidal marsh would be expected to continue to provide  
4       roosting and foraging habitat value for the greater sandhill crane. However, some of this  
5       restored marsh would be unsuitable as it would lack emergent vegetation and consist of open  
6       water that would be too deep to provide suitable roosting or foraging habitat. Approximately  
7       567 acres of habitat would be converted to nontidal marsh within the first 10 years of Plan  
8       implementation.
  
- 9       ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
10       actions included in CM11 that are designed to enhance wildlife values in restored or protected  
11       habitats could result in localized ground disturbances that could temporarily remove small  
12       amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
13       vegetation and road and other infrastructure maintenance activities, would be expected to have  
14       minor adverse effects on available habitat and would be expected to result in overall  
15       improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
16       these activities to result in direct mortality of greater sandhill crane would be minimized with  
17       the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction  
18       of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
19       Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
20       facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
21       disturbed areas when and where possible. If new ground disturbance was necessary, greater  
22       sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of  
23       grassland foraging habitat (1 acre of which would be impacted within the first 10 years of plan  
24       implementation).
  
- 25       ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
26       water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
27       disturbances that could affect greater sandhill crane use of the surrounding habitat.  
28       Maintenance activities would include vegetation management, levee and structure repair, and  
29       re-grading of roads and permanent work areas. These effects, could be adverse as sandhill  
30       cranes are sensitive to disturbance. However, effects of operations and maintenance on sandhill  
31       cranes would be reduced by AMMs, and conservation actions as described below.
  
- 32       ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
33       direct mortality of greater sandhill crane if they were present in the study area, because they  
34       would be expected to avoid contact with construction and other equipment. Effects would be  
35       avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*. The  
36       potential for injury and direct mortality from electrical transmission facilities is discussed below  
37       under Impact BIO-70.

38       The following paragraphs summarize the combined effects discussed above and describe other  
39       BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
40       included.

#### 41       ***Near-Term Timeframe***

42       Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43       the near-term BDCP conservation strategy has been evaluated to determine whether it would  
44       provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the

1 effects of construction would not be adverse under NEPA. Based on current design footprints, the  
2 Plan would remove 881 acres roosting and foraging habitat (148 acres of permanent loss, 733 acres  
3 of temporary loss) in the study area in the near-term. These effects would result from the  
4 construction of the water conveyance facilities (CM1). In addition, 10,673 acres of foraging habitat  
5 would be removed or converted in the near-term (CM1, 7,897 acres; *CM4 Tidal Natural Communities*  
6 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*  
7 *Enhancement and Management*—2,776 acres). Of these near-term acres of foraging habitat impact,  
8 7,871 acres would be moderate- to very high-value habitat (CM1, 5,944 acres, CM4-11, 1,927 acres).

9 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
10 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in  
11 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1  
12 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value  
13 foraging habitat. Using these ratios would indicate that 881 acres of greater roosting habitat should  
14 be restored/created and 881 acres should be protected to compensate for the CM1 losses of greater  
15 sandhill crane roosting and foraging habitat. In addition, 5,944 acres of high- to very high-value  
16 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-  
17 to very high-value foraging habitat. The near-term effects of other conservation actions would  
18 remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore require 1,927  
19 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and  
20 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
21 protection for the loss of foraging habitat).

22 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane  
23 roost sites were directly impacted by CM1 covered activities (including transmission lines and their  
24 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
25 result of water conveyance facility construction once the facilities were fully designed, which would  
26 avoid the CM1 impact on 881 acres of roosting and foraging habitat once the project design was  
27 final. Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill*  
28 *Crane*. Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the  
29 highest crane use areas in the Delta. Impacts on Bract Tract include the construction of the canal,  
30 proposed permanent and temporary transmission lines, potential borrow and spoil areas, and  
31 temporary work areas. Construction within or adjacent to this important crane use area would be  
32 adverse in the absence of other conservation measures. Mitigation Measure BIO-69b, *BDCP-Related*  
33 *Construction Will Not Result in a Net Decrease in Crane Use Days on Bract Tract* would be available to  
34 address the effects of construction activities on or adjacent to Bract Tract.

35 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
36 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
37 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
38 the construction and early restoration losses.

39 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
40 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
41 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
42 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
43 Sandhill Crane Winter Use Area, and would be in place prior to construction. Of the 500 acres of  
44 managed wetlands to be created for roosting habitat, 320 acres would be created in minimum patch  
45 sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective

1 GSHC1.3). Restoration sites would be identified with consideration of sea level rise and local  
2 seasonal flood events. These wetlands would be created within 2 miles of existing permanent roost  
3 sites and protected in association with other protected natural community types at a ratio of 2:1  
4 upland to wetland habitat to provide buffers that will protect cranes from the types of disturbances  
5 that would otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual  
6 disturbance, lighting). The remaining 180 acres of crane roosting habitat would be constructed  
7 within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be  
8 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane  
9 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide  
10 additional conservation to address the threats of vineyard conversion, urbanization to the east, and  
11 sea level rise to the west of greater sandhill crane wintering habitat.

12 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
13 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
14 BIO-69a, *Compensate for the Loss of Medium- to Very High-Value Greater Sandhill Crane Foraging*  
15 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
16 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were  
17 compensated for with appropriate crop types and natural communities.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 25 **Late Long-Term Timeframe**

26 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676  
27 acres of foraging habitat for greater sandhill crane. Alternative 1B as a whole would result in the  
28 permanent loss of and temporary effects on 922 acres of roosting and foraging habitat (4% of the  
29 total habitat in the study area) and 12,264 acres of foraging habitat (7% of the total habitat in the  
30 study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost by  
31 the late long-term timeframe would consist of 9,219 acres of medium- to very high-value foraging  
32 habitat. The locations of these losses are described above in the analyses of individual conservation  
33 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
34 were directly affected by water conveyance facilities including transmission lines and associated  
35 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
36 construction. However, it would not necessarily be restored to its original topography and it could  
37 result in the conversion of cultivated lands to grasslands.

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
39 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
40 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
41 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
42 GSHC1.1).

43 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
44 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,

1 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
2 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
3 permanent roost sites and protected in association with other protected natural community types at  
4 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
5 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
6 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
7 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
8 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
9 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
10 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
11 large patch sizes of these wetland complexes would provide additional conservation to address the  
12 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
13 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
14 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
15 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
16 highest-value foraging habitat for the species. Individual fields would be at least 40 acres and could  
17 shift locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
18 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
19 loss.

20 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
21 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
22 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
23 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
24 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
25 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
26 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
27 economically driven agricultural practices, protecting crane habitat would provide enhanced  
28 stability to agricultural habitat value within the crane use area that does not currently exist.  
29 Mitigation-Measure BIO-69a would be available to ensure that the loss of 9,219 acres of moderate-  
30 to very high-value crop types was compensated for with sufficient acres of high- to very high-value  
31 crop types by the late long-term timeframe. Mitigation Measure BIO-69b would be available to  
32 reduce effects from CM1 activities on or adjacent to Bract Tract.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 40 **CEQA Conclusion:**

#### 41 **Near-Term Timeframe**

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
44 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the

1 effects of construction would be less than significant under CEQA. Based on current design  
2 footprints, the Plan would remove 881 acres roosting and foraging habitat (148 acres of permanent  
3 loss, 733 acres of temporary loss) in the study area in the near-term. These effects would result from  
4 the construction of the water conveyance facilities (CM1). In addition, 10,673 acres of foraging  
5 habitat would be removed or converted in the near-term (CM1, 7,897 acres; *CM4 Tidal Natural*  
6 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*  
7 *Communities Enhancement and Management—2,776 acres*). Of these near-term acres of foraging  
8 habitat impact, 7,871 acres would be moderate- to very high-value habitat (CM1, 5,944 acres, CM4-  
9 11, 1,927 acres).

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
11 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in  
12 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1  
13 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value  
14 foraging habitat. Using these ratios would indicate that 881 acres of greater roosting habitat should  
15 be restored/created and 881 acres should be protected to compensate for the CM1 losses of greater  
16 sandhill crane roosting and foraging habitat. In addition, 5,944 acres of high- to very high-value  
17 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-  
18 to very high-value foraging habitat. The near-term effects of other conservation actions would  
19 remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore require 1,927  
20 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and  
21 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
22 protection for the loss of foraging habitat).

23 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane  
24 roost sites were directly impacted by CM1 covered activities (including transmission lines and their  
25 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
26 result of water conveyance facility construction once the facilities were fully designed, which would  
27 avoid the CM1 impact on 881 acres of roosting and foraging habitat once the project design was  
28 final. Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill*  
29 *Crane*. Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the  
30 highest crane use areas in the Delta. Impacts on Bract Tract include the construction of the canal,  
31 proposed permanent and temporary transmission lines, potential borrow and spoil areas, and  
32 temporary work areas. Construction within or adjacent to this important crane use area would be a  
33 significant impact in the absence of other conservation measures. Implementation of Mitigation  
34 Measure BIO-69b, *BDCP-Related Construction Will Not Result in a Net Decrease in Crane Use Days on*  
35 *Bract Tract*, would reduce the impact of construction activities on or adjacent to Bract Tract to a  
36 less-than-significant level.

37 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
38 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
39 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
40 the construction and early restoration losses. Up to 95 acres of roosting habitat would be created  
41 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
42 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
43 highest-value foraging habitat for the species. Individual fields would be at least 40 acres, could shift  
44 locations throughout the Greater Sandhill Crane Winter Use Area, and would be in place prior to  
45 construction. Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres  
46 would be created in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use

1 Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified with  
2 consideration of sea level rise and local seasonal flood events. These wetlands would be created  
3 within 2 miles of existing permanent roost sites and protected in association with other protected  
4 natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that will  
5 protect cranes from the types of disturbances that would otherwise result from adjacent roads and  
6 developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of crane  
7 roosting habitat would be constructed within the Stone Lakes NWR project boundary (BDCP  
8 Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes  
9 and Cosumnes greater sandhill crane populations (Objective GSHC1.4). The large patch sizes of  
10 these wetland complexes would provide additional conservation to address the threats of vineyard  
11 conversion, urbanization to the east, and sea level rise to the west of greater sandhill crane  
12 wintering habitat.

13 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
14 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
15 BIO-69a would guide the near-term protection of cultivated lands to ensure that the near-term  
16 impacts of moderate- to very high-value habitat for greater sandhill crane were compensated for  
17 with appropriate crop types and natural communities.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 25 ***Late Long-Term Timeframe***

26 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676  
27 acres of foraging habitat for greater sandhill crane. Alternative 1B as a whole would result in the  
28 permanent loss of and temporary effects on 922 acres of roosting and foraging habitat (4% of the  
29 total habitat in the study area) and 12,264 acres of foraging habitat (7% of the total habitat in the  
30 study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost by  
31 the late long-term timeframe would consist of 9,219 acres of medium- to very high-value foraging  
32 habitat. The locations of these losses are described above in the analyses of individual conservation  
33 measures.

34 The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites were  
35 directly affected by water conveyance facilities including transmission lines and associated  
36 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
37 construction. However, it would not necessarily be restored to its original topography and it could  
38 result in the conversion of cultivated lands to grasslands.

39 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
40 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
41 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
42 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
43 GSHC1.1).



1 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
2 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
3 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
4 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
5 permanent roost sites and protected in association with other protected natural community types at  
6 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
7 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
8 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
9 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
10 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
11 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
12 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
13 large patch sizes of these wetland complexes would provide additional conservation to address the  
14 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
15 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
16 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
17 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
18 highest-value foraging habitat for the species. Individual fields would be at least 40 acres and could  
19 shift locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
20 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
21 loss.

22 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
23 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
24 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
25 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
26 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
27 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
28 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
29 economically driven agricultural practices, protecting crane habitat would provide enhanced  
30 stability to agricultural habitat value within the crane use area that does not currently exist.  
31 Mitigation-Measure BIO-69a would be available to ensure that the loss of 9,219 acres of moderate-  
32 to very high-value crop types was compensated for with sufficient acres of high- to very high-value  
33 crop types by the late long-term timeframe.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
39 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
40 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

41 Considering Alternative 1B's protection and restoration provisions, in addition to Mitigation  
42 Measure BIO-69a, which would compensate for the loss of medium- to very high-value foraging  
43 habitat at a ratio of 1:1, and Mitigation Measure BIO-69b, which would require no loss of crane use  
44 on Bract Tract habitat, habitat loss and direct mortality through implementation of Alternative 1B  
45 would not result in a substantial adverse effect through habitat modifications and would not

1 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
2 would have a less-than-significant impact on greater sandhill crane.

3 **Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value**  
4 **Greater Sandhill Crane Foraging Habitat**

5 DWR will compensate for the loss of greater sandhill crane medium- to very high-value foraging  
6 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
7 Area. Compensation must occur prior to or concurrent within the impacts to minimize the  
8 effects of habitat loss. The crop types and natural communities that are included in foraging  
9 habitat value categories are listed in Table 12-1A-29. Foraging habitat conservation must occur  
10 within the greater sandhill crane winter use area and the location of protected habitat or  
11 conservation easements must be preapproved by USFWS and CDFW.

12 **Mitigation Measure BIO-69b: BDCP-Related Construction Will Not Result in a Net**  
13 **Decrease in Crane Use Days on Bract Tract**

14 Because of the density of greater sandhill cranes wintering on and adjacent to Bract Tract and  
15 the importance of Staten Island to the sustainability of the greater sandhill crane population in  
16 the Plan Area, DWR will minimize, to the extent practicable, the final placement of conveyance  
17 facilities on Bract Tract. BDCP-related construction shall not result in a net decrease in crane use  
18 on Bract Tract as determined by deriving greater sandhill crane use days for the entire winter  
19 period (see *AMM20 Greater Sandhill Crane* in BDCP Appendix 3.C, *Avoidance and Minimization*  
20 *Measures*, for a description of how loss of crane use will be estimated). This standard shall be  
21 achieved through some combination of the following (and including the avoidance and  
22 minimization measures for CM1 required under *AMM20 Greater Sandhill Crane*).

- 23 • Minimize and/or shift the footprint of activities on Bract Tract
- 24 • Minimize noise, lighting, and visual disturbances during construction
- 25 • Minimize construction activity during the crane wintering season to the extent practicable
- 26 • Supplemental feeding/foraging habitat enhancement: The enhanced habitat will consist of  
27 corn fields that will not be harvested, and will be managed to maximize food availability to  
28 greater sandhill cranes. A management plan for the enhanced habitat will be completed  
29 prior to establishing the habitat, in coordination with a qualified crane biologist (with at  
30 least 5 years of experience managing greater sandhill crane habitat on cultivated lands, or  
31 experience directing such management). The enhanced habitat will be located outside the  
32 construction related 50 dBA  $L_{eq}$  (1 hour) noise contour and within 1 mile of the affected  
33 habitat.
- 34 • Maintain flooding and irrigation capacity. Stage CM1 activities on Bract Tract such that they  
35 do not disrupt flooding and irrigation to the extent that greater sandhill crane habitat will be  
36 reduced during the crane wintering season.

37 Prior to construction on Bract Tract, a qualified, wildlife agency approved crane biologist will  
38 coordinate with DWR to develop a strategy for achieving the Bract Tract performance standard  
39 (no net decrease in crane use on Bract Tract) using a combination of the measures described  
40 above, and prepare a plan based on the final construction design on Bract Tract that includes all  
41 conservation measures necessary for achieving the performance standard. This plan will be  
42 subject to review and approval by the USFWS and CDFW prior to its implementation. All

1 conservation measures will be in place, consistent with the plan, prior to project construction on  
2 or adjacent to Bract Tract.

3 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission**  
4 **Facilities**

5 Greater sandhill cranes are susceptible to collision with power lines and other structures during  
6 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,  
7 Brown and Drewien 1995, Manville 2005). New transmission lines installed in the study area would  
8 increase the risk for bird-power line strikes, which could result in injury or mortality of greater  
9 sandhill cranes. Both permanent and temporary electrical transmission lines would be constructed  
10 to supply construction and operational power to BDCP facilities. Typically, higher-voltage (230-  
11 kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub” transmission (69-kV) lines vary  
12 from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The Alternative 1B alignment  
13 would require the installation of approximately 53 miles of permanent transmission line (16 miles  
14 of 230-kV lines and 37 miles of 69-kV lines) extending north and south, through much of the crane  
15 use area. The temporary transmission lines would total approximately 47 miles (14 miles of 69-kV  
16 line and 33 miles of 12-kV line). Temporary lines would be removed after construction of the water  
17 conveyance facilities, within 10 years. The proposed permanent and temporary transmission lines  
18 that would be constructed through Bract Tract as they are currently designed would have the  
19 potential to substantially affect greater sandhill cranes as this is a high-use area for cranes in the  
20 Delta.

21 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
22 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
23 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
24 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
25 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
26 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
27 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
28 the southwestern corner of the winter use area. This existing network of power lines in the study  
29 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
30 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
31 risk and have an adverse effect on the species in the absence of other conservation actions.

32 The potential mortality of greater sandhill crane in the area of the proposed transmission lines  
33 under Alternative 1B was estimated using collision mortality rates by Brown and Drewien (1995)  
34 and an estimate of potential crossings along the proposed lines (methods are described in BDCP  
35 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).  
36 Results indicate that in the absence of any line marking to increase visibility and reduce collision  
37 risk (i.e., without minimization measures), the average annual mortality of greater sandhill crane at  
38 permanent lines would be up to 89 fatalities per year and 54 fatalities per year at temporary lines.

39 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
40 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
41 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
42 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
43 mortality rate would be estimated to decrease to 29 fatalities per year for the permanent lines and  
44 19 fatalities per year for the temporary lines.

1 The current proposed transmission line alignment under Alternative 1B is not fully designed, and  
2 line locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that  
3 the final transmission line alignment would not result in a net increase in bird strike risk to greater  
4 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the  
5 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating  
6 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter  
7 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,  
8 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be  
9 expected to reduce existing mortality and thus fully offset the overall population effects of new  
10 transmission lines. Designing the alignment to minimize risk and removing, relocating, or  
11 undergrounding existing lines would be given priority out of the above methods. With these  
12 measures and the proposed mitigation, and considering that the temporary lines would be removed  
13 within the first 10 years of plan implementation, the risk of greater sandhill crane mortality from  
14 transmission lines would be reduced substantially.

15 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
16 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
17 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
18 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
19 the estimated mortality rate would be 29 fatalities per year from permanent transmission lines and  
20 19 fatalities per year from temporary transmission lines. The current proposed transmission line  
21 alignment under Alternative 1B is not fully designed, and line locations are not final. The  
22 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
23 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
24 risk in the Plan Area. With *AMM20 Greater Sandhill Crane* and the proposed mitigation, and  
25 considering that the temporary lines would be removed within the first 10 years of plan  
26 implementation, the risk of mortality from collision with transmission lines would have a less-than-  
27 significant impact on the greater sandhill crane population.

#### 28 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

29 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
30 Noise and visual disturbances from the construction of water conveyance facilities and other  
31 conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work  
32 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
33 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
34 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
35 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise  
36 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These  
37 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
38 maintenance of aboveground facilities, and similar activities. These potential effects would be  
39 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3.C,  
40 *Avoidance and Minimization Measures*.

41 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
42 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
43 crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
44 *Sandhill Crane*). The same methods were employed to addresses the potential noise effects on  
45 cranes from Alternative 1B and to determine that as much as much as 7,746-17,967 acres of crane

1 habitat could be affected by general construction noise above baseline level (50–60 dBA). This  
 2 would include 109 – 576 acres of permanent crane roosting habitat, 904 – 2,078 acres of temporary  
 3 crane roosting habitat, and 6,733 – 15,314 acres of crane foraging habitat. In addition, 252 - 950  
 4 acres of permanent crane roosting habitat, 471 – 1,623 acres of temporary crane roosting habitat,  
 5 and 1,623 – 18,043 acres of crane foraging habitat could be affected by noise from pile driving that  
 6 would be above baseline level (50–60dBA, Table 12-1B-30). The analysis was conducted based on  
 7 the assumption that there would be direct line-of-sight from sandhill crane habitat areas to the  
 8 construction site, and, therefore, provides a worst-case estimate of effects. In many areas the  
 9 existing levees would partially or completely block the line-of-sight and would function as effective  
 10 noise barriers, substantially reducing noise transmission. However, there is insufficient data to  
 11 assess the effects that increased noise levels would have on sandhill crane behavior.

12 **Table 12-1B-30. Greater Sandhill Crane Habitat Affected By General Construction and Pile Driving**  
 13 **Noise Under Alternative 1B (acres)**

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	109	576	252	950
Temporary Roosting	904	2,078	471	1,623
Foraging	6,733	15,314	1,623	18,043
<b>Total Habitat</b>	<b>7,746</b>	<b>17,967</b>	<b>2,347</b>	<b>20,616</b>

14  
 15 Evening and nighttime construction activities would require the use of extremely bright lights.  
 16 Nighttime construction could also result in headlights flashing into roost sites when construction  
 17 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
 18 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
 19 because of their height. Little data is available on the effects of impact of artificial lighting on  
 20 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
 21 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
 22 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
 23 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
 24 include a reduction in the cranes’ quality of nocturnal rest, and effects on their sense of photo-period  
 25 which might cause them to shift their physiology towards earlier migration and breeding (BDCP  
 26 Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes’ overall  
 27 fitness and reproductive success (which could in turn have population-level impacts). A change in  
 28 photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and  
 29 might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP  
 30 Chapter 5, *Effects Analysis*).

31 The effects of noise and visual disturbance on greater sandhill crane would be minimized through  
 32 the implementation of *AMM20 Greater Sandhill Crane* (Appendix 3.C, *Avoidance and Minimization*  
 33 *Measures*). Activities within 0.75 mile of crane roosting habitat would reduce construction noise  
 34 during night time hours (from one hour before sunset to one hour after sunrise) such that  
 35 construction noise levels do not exceed 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent  
 36 roosts during periods when the roost sites are available (flooded). In addition, the area of crane  
 37 foraging habitat that would be affected during the day (from one hour after sunrise to one hour  
 38 before sunset) by construction noise exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized.

1 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of  
2 foraging habitat for every acre indirectly affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise  
3 contour. With these measures in place, indirect effects of noise and visual disturbance from  
4 construction activities would not be expected to reduce the greater sandhill crane population in the  
5 study area.

6 The use of mechanical equipment during water conveyance facilities construction could cause the  
7 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the  
8 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater  
9 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*  
10 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that  
11 measures were in place to prevent runoff from the construction area and negative effects of dust on  
12 foraging habitat.

13 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
14 mercury in covered species, including greater sandhill crane. Marsh (tidal and nontidal) and  
15 floodplain restoration also have the potential to increase exposure to methylmercury. Mercury is  
16 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
17 subjected to regular wetting and drying such as tidal marshes and flood plains. Thus, BDCP  
18 restoration activities that create newly inundated areas could increase bioavailability of mercury  
19 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
20 associated with natural community and floodplain restoration may indirectly affect greater sandhill  
21 crane via uptake in lower trophic levels (BDCP Appendix 5.D, *Contaminants*). In general, the highest  
22 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
23 drying and associated anoxic conditions (Alpers et al. 2008). The potential mobilization or creation  
24 of methylmercury within the study area varies with site-specific conditions and would need to be  
25 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
26 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
27 management and monitoring, *CM12 Methylmercury Management* would be available to address the  
28 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on greater  
29 sandhill crane. The potential indirect effects of increased mercury exposure is likely low for greater  
30 sandhill crane for the following reasons: 1) greater sandhill cranes occur in the study area only  
31 during the nonbreeding winter months, 2) their primary foraging habitats in the study area are  
32 cultivated crops, and 3) the use of restored tidal wetlands by cranes is likely to be limited compared  
33 to seasonal managed wetlands.

34 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
35 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
36 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
37 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
38 effect of selenium toxicity differs widely between species and also between age and sex classes  
39 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
40 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

41 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
42 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
43 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
44 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
45 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San

1 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
2 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
3 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
4 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
5 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
6 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
7 levels of selenium have a higher risk of selenium toxicity.

8 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
9 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
10 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh  
11 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
12 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
13 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
14 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
15 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
16 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
17 long-term increases in selenium concentrations in water in the Delta under any alternative.  
18 However, it is difficult to determine whether the effects of potential increases in selenium  
19 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to  
20 adverse effects on greater sandhill crane.

21 Because of the uncertainty that exists at this programmatic level of review, there could be a  
22 substantial effect on greater sandhill crane from increases in selenium associated with restoration  
23 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
24 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
25 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
26 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
27 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
28 separately for each restoration effort as part of design and implementation. This avoidance and  
29 minimization measure would be implemented as part of the tidal habitat restoration design  
30 schedule.

31 **CEQA Conclusion:** Crane foraging habitat could be affected by general construction noise (7,746–  
32 17,967 acres) and pile driving (2,347–20,616 acres) above baseline level (50–60 dBA). Construction  
33 in certain areas would take place 7 days a week and 24 hours a day and evening and nighttime  
34 construction activities would require the use of extremely bright lights, which could adversely affect  
35 roosting cranes by impacting their sense of photo-period and by exposing them to predators. The  
36 effects of noise and visual disturbances would be reduced through the implementation of *AMM20*  
37 *Greater Sandhill Crane* which would include requirements (described above) to minimize the effects  
38 of noise and visual disturbance on greater sandhill cranes. With these measures in place, in addition  
39 to AMM1–AMM7, noise and visual disturbances, the potential for hazardous spills, increased dust  
40 and sedimentation, and operations and maintenance of the water conveyance facilities would have a  
41 less-than-significant impact on greater sandhill crane. The implementation of tidal natural  
42 communities restoration or floodplain restoration could result in increased exposure of greater  
43 sandhill crane to methylmercury. The potential indirect effects of increased mercury exposure is  
44 likely low for greater sandhill crane for the following reasons: 1) greater sandhill cranes occur in the  
45 study area only during the nonbreeding winter months, 2) their primary foraging habitats in the  
46 study area are cultivated crops, and 3) the use of restored tidal wetlands by cranes is likely to be

1 limited compared to seasonal managed wetlands. Site-specific restoration plans that address the  
2 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
3 in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
4 methylmercury levels in restored tidal marsh and potential impacts on greater sandhill crane. Tidal  
5 habitat restoration could result in increased exposure of greater sandhill crane to selenium. This  
6 effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
7 would provide specific tidal habitat restoration design elements to reduce the potential for  
8 bioaccumulation of selenium and its bioavailability in tidal habitats. With these measures in place,  
9 the indirect effects of plan implementation would have a less-than-significant impact on greater  
10 sandhill crane.

### 11 **Lesser Sandhill Crane**

12 This section describes the effects of Alternative 1B, including water conveyance facilities  
13 construction and implementation of other conservation components, on lesser sandhill crane. Lesser  
14 sandhill cranes in the study area are almost entirely dependent on privately owned agricultural  
15 lands for foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on  
16 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining  
17 compatible agricultural practices, while sustaining and increasing the extent of other essential  
18 habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane includes  
19 “roosting and foraging” and “foraging” habitat. These habitat types include suitable foraging and  
20 roosting habitat in the study area as certain agricultural types, specific grassland types, irrigated  
21 pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland. Roosting  
22 and foraging habitat includes traditional roost sites that are known to be used by sandhill cranes  
23 (both greater and lesser) and also provide foraging habitat. Detail regarding the roosting and  
24 foraging modeled habitat for both subspecies of sandhill crane is included in the BDCP (BDCP  
25 Appendix 2.A *Covered Species Accounts*). Both temporary and permanent roost sites were identified  
26 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,  
27 while temporary roosting and foraging sites are those used in some years. Factors included in  
28 assessing the loss of foraging habitat for the lesser sandhill crane considers the relative habitat value  
29 of specific crop or land cover types. Although both the greater and the lesser Sandhill crane use  
30 similar crop or land cover types, these provide different values of foraging habitat for the two  
31 subspecies based on proportional use of these habitats. Lesser sandhill cranes are less traditional  
32 than greater sandhill cranes and are more likely to move between different roost site complexes and  
33 different wintering regions (Ivey pers. comm.). The wintering range is ten times larger than the  
34 greater sandhill crane and their average foraging flight radius from roost sites is twice that of  
35 greater sandhill cranes. Because of this higher mobility, lesser sandhill cranes are more flexible in  
36 their use of foraging areas than the greater sandhill crane.

37 Construction and restoration associated with Alternative 1B conservation measures would result in  
38 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as  
39 indicated in Table 12-1B-31. Full implementation of Alternative 1B would include the following  
40 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP Chapter 3,  
41 Section 3.3, *Biological Goals and Objectives*) that would also benefit the lesser sandhill crane.

- 42 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
43 least 80% maintained in very high-value types in any given year. This protected habitat will be  
44 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
45 local seasonal flood events, greater sandhill crane population levels, and the location of foraging



- 1 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective  
2 GSHC1.1, associated with CM3).
- 3 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
4 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or  
5 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be  
6 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
7 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
8 habitat loss (Objective GSHC1.2, associated with CM3).
  - 9 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
10 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
11 and local seasonal flood events. The wetlands will be located within 2 miles of existing  
12 permanent roost sites and protected in association with other protected natural community  
13 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
14 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
  - 15 ● Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge  
16 project boundary. The complexes will be no more than 2 miles apart and will help provide  
17 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each  
18 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane  
19 roosting habitat, and will be protected in association with other protected natural community  
20 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,  
21 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
22 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
23 support roosting cranes and provide highest-value foraging habitat, provided such substitution  
24 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for  
25 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
  - 26 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
27 sites. The habitat will consist of active cornfields that are flooded following harvest to support  
28 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least  
29 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will  
30 be sited with consideration of the location of roosting habitat loss and will be in place prior to  
31 roosting habitat loss (Objective GSCH1.5, associated with CM3).
  - 32 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
33 other native wildlife species (Objective CLNC1.1, associated with CM3).
  - 34 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
35 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
36 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
  - 37 ● Target cultivated land conservation to provide connectivity between other conservation lands  
38 (Objective CLNC1.2, associated with CM3).
  - 39 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
40 lands that occur in cultivated lands within the reserve system, including, water conveyance  
41 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 2 natural community enhancement and management commitments (including *CM12 Methylmercury*  
 3 *Management*) and implementation of AMM1–AMM7, *AMM20 Greater Sandhill Crane*, *AMM27*  
 4 *Selenium Management*, *AMM30 Transmission Line Design and Alignment Guidelines*, and Mitigation  
 5 Measures BIO-72 and BIO-69b, impacts on the lesser sandhill crane would be less than significant  
 6 for CEQA purposes.

7 **Table 12-1B-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 1B**  
 8 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	148	148	733	733	NA	NA
	Foraging	4,002	4,002	6,806	6,806	NA	NA
<b>Total Impacts CM1</b>		<b>4,150</b>	<b>4,150</b>	<b>7,539</b>	<b>7,539</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,131	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>3,610</b>	<b>12,172</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Roosting and Foraging - Permanent</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Roosting and Foraging - Temporary</b>		<b>148</b>	<b>189</b>	<b>733</b>	<b>733</b>	<b>0</b>	<b>0</b>
<b>Foraging</b>		<b>7,612</b>	<b>16,133</b>	<b>6,806</b>	<b>6,806</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>7,760</b>	<b>16,322</b>	<b>7,539</b>	<b>7,539</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

<sup>e</sup> Restored/created and protected habitat acreages represent planned conservation activities that would be implemented over the lifetime of the BDCP (see BDCP Chapter 3, *Conservation Strategy*, for specifics).

NT = near-term

LLT = late long-term

NA = not applicable

## 1 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill** 2 **Crane**

3 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
4 of up to 922 acres of modeled roosting and foraging habitat (189 acres of permanent loss and 733  
5 acres of temporary loss) and 19,892 acres of foraging habitat (15,372 acres of permanent loss and  
6 4,520 acres of temporary loss) for lesser sandhill crane (Table 12-1B-31). Conservation measures  
7 that would result in these losses are conveyance facilities and transmission line construction, and  
8 establishment and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements  
9 (CM2), Tidal Natural Communities Restoration (CM4), Grassland Natural Community Restoration  
10 (CM8), Nontidal Marsh Natural Community Restoration (CM10), and Natural Communities  
11 Enhancement and Management (CM11). The majority of habitat loss would result from water  
12 conveyance facility construction and conversion of habitat to tidal natural communities through  
13 CM4. Habitat enhancement and management activities through CM11, which include ground  
14 disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In  
15 addition, maintenance activities associated with the long-term operation of the water conveyance  
16 facilities and other BDCP physical facilities could degrade or eliminate lesser sandhill crane modeled  
17 habitat. Each of these individual activities is described below. A summary statement of the combined  
18 impacts, NEPA effects and a CEQA conclusion follow the individual conservation measure  
19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities as they  
21 are currently designed would result in the combined permanent and temporary loss of up to  
22 10,808 acres of modeled lesser sandhill crane habitat. This would consist of the permanent  
23 removal of 148 acres of roosting and foraging habitat, and 4,002 acres of foraging habitat.  
24 Foraging habitat that would be permanently impacted by CM1 would consist of 2,001 acres of  
25 very high-value, 157 acres of high-value, and 789 acres of medium-value foraging habitat (Table  
26 12-1B-32). In addition, 733 acres of temporary roosting and foraging habitat and 6,806 acres of  
27 foraging habitat would be temporarily removed (Table 12-1B-31). The temporarily removed  
28 habitat would consist primarily of cultivated lands and it would be restored within one year  
29 following construction. However, it would not necessarily be restored to its original topography  
30 and it could be restored as grasslands in the place of cultivated lands. CM1 activities that would  
31 result in temporary impacts would include temporary access roads, borrow and spoil sites, and  
32 work areas for construction.

33 The temporary roost sites that would be permanently impacted are located on Zaccharias  
34 Island, Shin Kee Tract, and Ringe Tract and impacts would occur from the construction of the  
35 canal and the proposed permanent transmission line footprint. Temporary impacts on  
36 temporary roosting and foraging habitat would occur from temporary work areas associated  
37 with the construction of the canal and borrow and spoil areas. Approximately 642 acres of  
38 temporary impact on temporary roosting and foraging sites would occur from the footprint of  
39 the borrow and spoil areas associated with the construction of the canal. Indirect effects of  
40 construction of the canal adjacent to Stone Lakes National Wildlife Refuge could result in the  
41 abandonment of roost sites adjacent to the CM1 footprint. Indirect effects of noise and visual  
42 disturbance are addressed under Impact BIO-71.

43 The implementation of AMM20 Greater Sandhill Crane would require that all CM1 activities be  
44 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be  
45 accomplished either by siting activities outside of identified roost sites or by relocating the roost  
46 site if it consisted of cultivated lands. Relocated roost sites would be established prior to

1 construction activities affecting the original roost site (as described in *AMM20 Greater Sandhill*  
2 *Crane*, BDCP Appendix 3C, *Avoidance and Minimization Measures*). Therefore there would be no  
3 loss of crane roosting and foraging habitat as a result of water conveyance facility construction  
4 once the facilities were fully designed.

5 Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the  
6 highest crane use areas in the Delta. Impacts on Bract Tract include the construction of the  
7 canal, proposed permanent and temporary transmission lines, potential borrow and spoil areas,  
8 and temporary work areas. Construction within or adjacent to this important crane use area  
9 would have an adverse effect in the absence of other conservation measures. The potential for  
10 injury and direct mortality from electrical transmission facilities is addressed below under  
11 Impact BIO-70. The transmission line alignment under Alternative 1B is not fully designed and  
12 the final transmission line design would be determined in coordination with USFWS, CDFW, and  
13 a qualified crane biologist to achieve a performance standard of no net increase in bird strike  
14 hazard to greater sandhill cranes in the Plan Area (*AMM20 Greater Sandhill Crane*). Mitigation  
15 Measure BIO-69b, *BDCP-Related Construction Will Not Result in a Net Decrease in Crane Use Days*  
16 *on Bract Tract* would be available to address the effects of construction activities on or adjacent  
17 to Bract Tract on greater sandhill cranes. Measures to meet the performance standards of no net  
18 increase in bird strike hazard to greater sandhill cranes in the Plan Area and no net decrease in  
19 crane use days on Bract Tract would also reduce effects on lesser sandhill cranes.

20 Permanent and temporary impacts on foraging habitat would occur throughout the Delta from  
21 the construction of Intakes 1-5, construction of the canal, and associated borrow and spoil and  
22 RTM storage areas along the canal alignment. Approximately 5,456 acres of temporary impact  
23 on foraging habitat would result from the footprint of the borrow and spoil areas associated  
24 with the construction of the intakes and the canal. Approximately 223 acres of the permanent  
25 loss of foraging habitat would be from the storage of reusable tunnel material. This material  
26 would likely be moved to other sites for use in levee build-up and restoration, and the affected  
27 area would likely eventually be restored. While this effect is categorized as permanent because  
28 there is no assurance that the material would eventually be moved, the effect would likely be  
29 temporary. The actual footprint of the storage areas required for reusable tunnel material is  
30 flexible, and the actual acreage of habitat affected by this activity could be reduced based on the  
31 height of the storage piles in addition to other considerations. The implementation of *AMM6*  
32 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, would require that  
33 the areas used for reusable tunnel material storage be minimized in crane foraging habitat and  
34 completely avoid crane roost sites. Refer to the Terrestrial Biology Map Book for a detailed view  
35 of Alternative 1B construction locations. Impacts from CM1 would occur within the first 10  
36 years of Plan implementation.

1 **Table 12-1B-32. Total Amount of Affected Lesser Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2-CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	2,001 (4,497)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	157 (186)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	789 (659)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	969 (1,421)	3,745 (2)
None	Vineyards, orchards	85 (43)	23 (0)

2

- 3 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent  
4 loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2.  
5 Lesser sandhill crane use in this area is less common than in the central Delta. Construction  
6 impacts from CM2 would occur within the first 10 years of Plan implementation.
- 7 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration  
8 footprint, this activity would result in the permanent loss or conversion of approximately  
9 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and  
10 foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would  
11 consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value,  
12 and 2,983 acres of low-value foraging habitat (Table 12-1B-32). Habitat loss would primarily  
13 occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ  
14 4 could occur between the high crane use areas of the central Delta and the Cosumnes River  
15 Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would  
16 not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less  
17 traditional than greater sandhill cranes and would be more adaptable to changes in land use.  
18 Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of  
19 Plan implementation.
- 20 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in  
21 the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1  
22 acres of temporary loss). This impact would occur after the first 10 years of Plan  
23 implementation.
- 24 • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands  
25 (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be

1 impacted by grassland restoration activities. The restored grasslands would continue to provide  
2 foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted  
3 within the first 10 years of plan implementation.

- 4 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
5 conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill  
6 crane. A portion of the restored nontidal marsh would be expected to continue to provide  
7 roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored  
8 marsh would be unsuitable as it would lack emergent vegetation and consist of open water that  
9 would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of  
10 habitat would be converted to nontidal marsh within the first 10 years of Plan implementation.
- 11 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
12 actions included in *CM11* that are designed to enhance wildlife values in restored or protected  
13 habitats could result in localized ground disturbances that could temporarily remove small  
14 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
15 vegetation and road and other infrastructure maintenance activities, would be expected to have  
16 minor adverse effects on available habitat and would be expected to result in overall  
17 improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
18 these activities to result in direct mortality of lesser sandhill crane would be minimized with the  
19 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of  
20 recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
21 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
22 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
23 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill  
24 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland  
25 foraging habitat (1 acre of which would be impacted within the first 10 years of plan  
26 implementation).
- 27 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
28 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
29 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance  
30 activities would include vegetation management, levee and structure repair, and re-grading of  
31 roads and permanent work areas. These effects, could be adverse as sandhill cranes are  
32 sensitive to disturbance. However, potential impacts would be reduced by AMMs, and  
33 conservation actions as described below.
- 34 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
35 direct mortality of lesser sandhill crane if they were present in the study area, because they  
36 would be expected to avoid contact with construction and other equipment. Potential effects  
37 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
38 Injury and mortality from electrical transmission facilities are described below under Impact  
39 BIO-73.

40 The following paragraphs summarize the combined effects discussed above and describe other  
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
42 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
3 term BDCP conservation strategy has been evaluated to determine whether it would provide  
4 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Based on current design footprints, the  
6 Plan would remove 881 acres roosting and foraging habitat (148 acres of permanent loss, 733 acres  
7 of temporary loss) in the study area in the near-term. These effects would result from the  
8 construction of the water conveyance facilities (CM1). In addition, 14,420 acres of foraging habitat  
9 would be removed or converted in the near-term (CM1, 10,807 acres; *CM4 Tidal Natural*  
10 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*  
11 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging  
12 habitat impact, 10,795 acres would be moderate- to very high-value habitat (CM1, 8,289 acres, CM4-  
13 11, 2,507 acres).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
15 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
16 habitat. Using these ratios would indicate that 881 acres of lesser sandhill crane roosting habitat  
17 should be restored/created and 881 acres should be protected to compensate for the CM1 losses of  
18 lesser sandhill crane roosting and foraging habitat. In addition, 8,289 acres of high- to very high-  
19 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane  
20 medium- to very high-value foraging habitat. The near-term effects of other conservation actions  
21 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require  
22 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA  
23 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
24 protection for the loss of foraging habitat).

25 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
26 sites were directly impacted by CM1 covered activities (including transmission lines and their  
27 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
28 result of water conveyance facility construction once the facilities were fully designed, which would  
29 avoid the CM1 impact on 881 acres of roosting and foraging habitat once the project design is final.  
30 Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill Crane*.  
31 Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the highest  
32 crane use areas in the Delta. Impacts on Bract Tract include the construction of the canal, proposed  
33 permanent and temporary transmission lines, potential borrow and spoil areas, and temporary  
34 work areas. Construction within or adjacent to this important crane use area would be adverse in  
35 the absence of other conservation measures. Mitigation Measure BIO-69b, *BDCP-Related*  
36 *Construction Will Not Result in a Net Decrease in Crane Use Days on Bract Tract* would be available to  
37 address the potential effects of construction activities on or adjacent to Bract Tract.

38 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
39 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
40 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
41 the construction and early restoration losses.

42 The BDCP also includes the following objectives for the greater sandhill crane which would also  
43 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
44 winter use areas.

1 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
2 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
3 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
4 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
5 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
6 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
7 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
8 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
9 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
10 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
11 protected in association with other protected natural community types at a ratio of 2:1 upland to  
12 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
13 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
14 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
15 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide  
16 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective  
17 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation  
18 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west  
19 of greater sandhill crane wintering habitat.

20 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
21 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
22 BIO-72, *Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*  
23 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
24 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
25 compensated for with appropriate crop types and natural communities.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
31 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
32 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 33 ***Late Long-Term Timeframe***

34 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
35 acres of foraging habitat for lesser sandhill crane. Alternative 1B as a whole would result in the  
36 permanent loss of and temporary effects on 952 acres of roosting and foraging habitat (4% of the  
37 total habitat in the study area) and 22,940 acres of foraging habitat (10% of the total habitat in the  
38 study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by the  
39 late long-term timeframe would consist of 16,652 acres of medium- to very high-value foraging  
40 habitat. The locations of these losses are described above in the analyses of individual conservation  
41 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
42 were directly affected by water conveyance facilities including transmission lines and associated  
43 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
44 construction. However, it would not necessarily be restored to its original topography and it could  
45 result in the conversion of cultivated lands to grasslands.



1 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
2 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
3 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
4 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
5 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser  
6 sandhill crane.

7 The BDCP also includes the following objectives for the greater sandhill crane which would also  
8 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
9 winter use areas.

10 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
11 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
12 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
13 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
14 permanent roost sites and protected in association with other protected natural community types at  
15 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
16 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
17 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
18 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
19 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
20 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
21 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
22 large patch sizes of these wetland complexes would provide additional conservation to address the  
23 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
24 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
25 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
26 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
27 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
28 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
29 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
30 loss.

31 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
32 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
33 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
34 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
35 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
36 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
37 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
38 economically driven agricultural practices, protecting crane habitat would provide enhanced  
39 stability to agricultural habitat value within the crane use area that does not currently exist.  
40 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these  
41 objectives for the greater sandhill crane would also benefit the lesser sandhill crane. Mitigation-  
42 Measure BIO-72 would be available to ensure that the loss of 16,652 acres of moderate- to very  
43 high-value crop types was compensated for with sufficient acres of high- to very high-value crop  
44 types by the late long-term timeframe. Mitigation Measure BIO-69b would be available to reduce  
45 adverse effects from CM1 activities on or adjacent to Bract Tract.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
6 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
7 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

8 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential for direct mortality of this  
9 special status species under Alternative 1B would represent an adverse effect in the absence of  
10 other conservation actions. However, with habitat protection and restoration associated with *CM3*  
11 *Natural Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by  
12 biological goals and objectives for the species and by *AMM1–AMM7* and *AMM20 Greater Sandhill*  
13 *Crane*, which would be in place throughout the construction period, and with implementation of  
14 Mitigation Measure BIO-69b and Mitigation Measure BIO-72, which would be available to  
15 compensate for loss of medium- to very high-value foraging habitat, the effects of habitat loss and  
16 potential mortality on lesser sandhill crane would not be adverse under NEPA.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
20 term BDCP conservation strategy has been evaluated to determine whether it would provide  
21 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
22 effects of construction would be less than significant under CEQA. Based on current design  
23 footprints, the Plan would remove 881 acres roosting and foraging habitat (148 acres of permanent  
24 loss, 733 acres of temporary loss) in the study area in the near-term. These effects would result from  
25 the construction of the water conveyance facilities (CM1). In addition, 14,420 acres of foraging  
26 habitat would be removed or converted in the near-term (CM1, 10,807 acres; *CM4 Tidal Natural*  
27 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*  
28 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging  
29 habitat impact, 10,795 acres would be moderate- to very high-value habitat (CM1, 8,289 acres, *CM4-*  
30 *11*, 2,507 acres).

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
32 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
33 habitat. Using these ratios would indicate that 881 acres of lesser sandhill crane roosting habitat  
34 should be restored/created and 881 acres should be protected to compensate for the CM1 losses of  
35 lesser sandhill crane roosting and foraging habitat. In addition, 8,289 acres of high- to very high-  
36 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane  
37 medium- to very high-value foraging habitat. The near-term effects of other conservation actions  
38 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require  
39 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA  
40 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
41 protection for the loss of foraging habitat).

42 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
43 sites were directly impacted by CM1 covered activities (including transmission lines and their  
44 associated footprints). Therefore, there would be no loss of crane roosting and foraging habitat as a

1 result of water conveyance facility construction once the facilities were fully designed, which would  
2 avoid the CM1 impact on 881 acres of roosting and foraging habitat once the project design is final.  
3 Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill Crane*.  
4 Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the highest  
5 crane use areas in the Delta. Impacts on Bract Tract include the construction of the canal, proposed  
6 permanent and temporary transmission lines, potential borrow and spoil areas, and temporary  
7 work areas. Construction within or adjacent to this important crane use area would be adverse in  
8 the absence of other conservation measures. Implementation of Mitigation Measure BIO-69b, *BDCP-*  
9 *Related Construction Will Not Result in a Net Decrease in Crane Use Days on Bract Tract*, (see Impact  
10 BIO-69) would address the impact of construction activities on or adjacent to Bract Tract.

11 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
12 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
13 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
14 the construction and early restoration losses.

15 The BDCP also includes the following objectives for the greater sandhill crane which would also  
16 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
17 winter use areas.

18 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
19 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
20 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
21 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
22 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
23 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
24 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
25 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
26 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
27 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
28 protected in association with other protected natural community types at a ratio of 2:1 upland to  
29 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
30 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
31 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
32 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide  
33 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective  
34 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation  
35 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west  
36 of greater sandhill crane wintering habitat.

37 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
38 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
39 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the  
40 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
41 compensated for with appropriate crop types and natural communities.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
2 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
3 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
4 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

5 ***Late Long-Term Timeframe***

6 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
7 acres of foraging habitat for lesser sandhill crane. Alternative 1B as a whole would result in the  
8 permanent loss of and temporary effects on 952 acres of roosting and foraging habitat (4% of the  
9 total habitat in the study area) and 22,940 acres of foraging habitat (10% of the total habitat in the  
10 study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by the  
11 late long-term timeframe would consist of 16,652 acres of medium- to very high-value foraging  
12 habitat. The locations of these losses are described above in the analyses of individual conservation  
13 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
14 were directly affected by water conveyance facilities including transmission lines and associated  
15 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
16 construction. However, it would not necessarily be restored to its original topography and it could  
17 result in the conversion of cultivated lands to grasslands.

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
19 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
20 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
21 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
22 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser  
23 sandhill crane.

24 The BDCP also includes the following objectives for the greater sandhill crane which would also  
25 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
26 winter use areas.

27 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
28 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
29 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
30 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
31 permanent roost sites and protected in association with other protected natural community types at  
32 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
33 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
34 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
35 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
36 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
37 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
38 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
39 large patch sizes of these wetland complexes would provide additional conservation to address the  
40 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
41 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
42 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
43 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
44 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift

1 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
2 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
3 loss.

4 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
5 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
6 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
7 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
8 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
9 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
10 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
11 economically driven agricultural practices, protecting crane habitat would provide enhanced  
12 stability to agricultural habitat value within the crane use area that does not currently exist.  
13 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these  
14 objectives for the greater sandhill crane would also benefit the lesser sandhill crane. Mitigation-  
15 Measure BIO-72 would be available to ensure that the loss of 16,652 acres of moderate- to very  
16 high-value crop types was compensated for with sufficient acres of high- to very high-value crop  
17 types by the late long-term timeframe. Implementation of Mitigation Measure BIO-69b would  
18 reduce impacts resulting from CM1 activities on or adjacent to Bract Tract to a less-than-significant  
19 level.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
25 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
26 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

27 Considering Alternative 1B's protection and restoration provisions, in addition to Mitigation  
28 Measure BIO-69b, which would reduce significant impacts from CM1 activities on Bract Tract, and  
29 Mitigation Measure BIO-72, which would compensate for the loss of medium- to very high-value  
30 foraging habitat at a ratio of 1:1, loss of habitat or direct mortality through implementation of  
31 Alternative 1B would not result in a substantial adverse effect through habitat modifications and  
32 would not substantially reduce the number or restrict the range of the species. Therefore, the  
33 alternative would have a less-than-significant impact on lesser sandhill crane.

34 **Mitigation Measure BIO-69b: BDCP-Related Construction Will Not Result in a Net**  
35 **Decrease in Crane Use Days on Bract Tract**

36 See description of Mitigation Measure BIO-69b under Impact BIO-69.

37 **Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value**  
38 **Lesser Sandhill Crane Foraging Habitat**

39 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging  
40 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
41 Area. Compensation must occur prior to or concurrent with the impacts to minimize the effects  
42 of habitat loss. The crop types and natural communities that are included in foraging value  
43 categories are listed in Table 12-4-32. Foraging habitat conservation must occur within 10

1 kilometers of traditional sandhill crane roost sites and the location of protected habitat or  
2 conservation easements must be preapproved by CDFW.

3 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission**  
4 **Facilities**

5 Sandhill cranes are susceptible to collision with power lines and other structures during periods of  
6 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and  
7 Drewien 1995, Manville 2005). New transmission lines installed in the study area would increase  
8 the risk for bird-power line strikes, which could result in injury or mortality of lesser sandhill  
9 cranes. Both permanent and temporary electrical transmission lines would be constructed to supply  
10 construction and operational power to BDCP facilities. Typically, higher-voltage (230-kilovolt [kV])  
11 lines vary in height from 90 to 110 feet, while “sub” transmission (69-kV) lines vary from 50 to 70  
12 feet (Avian Power Line Interaction Committee 2006). The Alternative 1B alignment would require  
13 the installation of approximately 53 miles of permanent transmission line (16 miles of 230-kV lines  
14 and 37 miles of 69-kV lines) extending north and south, through much of the crane use area. The  
15 temporary transmission lines would total approximately 47 miles (14 miles of 69-kV line and  
16 33 miles of 12-kV line). Temporary lines would be removed after construction of the water  
17 conveyance facilities, within 10 years. The proposed permanent and temporary transmission lines  
18 that would be constructed through Bract Tract as they are currently designed would have the  
19 potential to substantially affect lesser sandhill cranes as this is a high-use area for cranes in the  
20 Delta.

21 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
22 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
23 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
24 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
25 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
26 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
27 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
28 the southwestern corner of the winter use area. This existing network of power lines in the study  
29 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
30 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
31 risk and have an adverse effect on the species in the absence of other conservation actions.

32 The potential mortality of greater sandhill crane in the area of the proposed transmission lines  
33 under Alternative 1A was estimated using collision mortality rates by Brown and Drewien (1995)  
34 and an estimate of potential crossings along the proposed lines (methods are described in BDCP  
35 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).  
36 Results indicate that in the absence of any line marking to increase visibility and reduce collision  
37 risk (i.e., without minimization measures), the average annual mortality of greater sandhill crane at  
38 permanent lines would be up to 89 fatalities per year and would be 54 fatalities per year at  
39 temporary lines. Lesser sandhill cranes use the same roost sites as greater sandhill cranes. However,  
40 their numbers fluctuate greatly over the season as they are more mobile and use a broader  
41 landscape than greater sandhill cranes. Although the roost population sizes would fluctuate more  
42 for lesser sandhill cranes, one could expect that proportionally, the total number of potential  
43 fatalities for the lesser sandhill crane would be similar to those of the greater sandhill crane.

1 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
2 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
3 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
4 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
5 mortality rate is estimated to decrease to 29 fatalities per year for the permanent lines and 19  
6 fatalities per year for the temporary lines.

7 The current proposed transmission line alignment under Alternative 1B is not fully designed, and  
8 line locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that  
9 the final transmission line alignment would not result in a net increase in bird strike risk to greater  
10 sandhill cranes in the Plan Area. This performance standard would also protect lesser sandhill  
11 cranes from birdstrike impacts in the Plan Area and would be achieved by implementing any  
12 combination of the following: (1) siting new transmission lines in lower bird strike risk zones; (2)  
13 removing, relocating or undergrounding existing lines; (3) installing flight diverters on existing lines  
14 in the crane winter use area; and/or (4) for areas outside of the Stone Lakes National Wildlife  
15 Refuge project boundary, shifting locations of flooded areas that provide crane roosts to lower risk  
16 areas. This would be expected to reduce existing mortality and thus fully offset the overall  
17 population effects of new transmission lines. Designing the alignment to minimize risk and  
18 removing, relocating, or undergrounding existing lines would be given priority out of the above  
19 methods. With these measures and the proposed mitigation, and considering that the temporary  
20 lines would be removed within the first 10 years of plan implementation, the risk of lesser sandhill  
21 crane mortality from transmission lines would be reduced substantially.

22 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
23 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
24 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
25 mortality of lesser sandhill cranes. By incorporating line-marking devices on new transmission lines  
26 the estimated mortality rate for the greater sandhill crane would be 29 fatalities per year from  
27 permanent transmission lines and 19 fatalities per year from temporary transmission lines. Similar  
28 fatality rates would be expected for the lesser sandhill crane. The current proposed transmission  
29 line alignment under Alternative 1B is not fully designed, and line locations are not final. The  
30 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
31 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
32 risk in the Plan Area. With *AMM20 Greater Sandhill Crane* and the proposed mitigation, and  
33 considering that the temporary lines would be removed within the first 10 years of plan  
34 implementation, the risk of mortality from collision with transmission lines would not result in an  
35 adverse effect on the lesser sandhill crane population.

36 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
37 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
38 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
39 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
40 the estimated mortality rate for the greater sandhill crane would be 29 fatalities per year from  
41 permanent transmission lines and 19 fatalities per year from temporary transmission lines. Similar  
42 fatality rates would be expected for the lesser sandhill crane. The current proposed transmission  
43 line alignment under Alternative 1B is not fully designed, and line locations are not final. The  
44 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
45 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
46 risk in the Plan Area. With *AMM20 Greater Sandhill Crane* and the proposed mitigation, and

1 considering that the temporary lines would be removed within the first 10 years of plan  
2 implementation, the risk of mortality from collision with transmission lines would result in a less-  
3 than-significant impact on the lesser sandhill crane population.

#### 4 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

5 **Indirect construction-related effects:** Sandhill cranes are sensitive to disturbance. Noise and  
6 visual disturbances from the construction of water conveyance facilities and other conservation  
7 measures could reduce lesser sandhill crane use of modeled habitat adjacent to work areas. Indirect  
8 effects associated with construction include noise, dust, and visual disturbance caused by grading,  
9 filling, contouring, and other ground-disturbing operations outside the project footprint but within  
10 1,300 feet of the construction edge. Furthermore, maintenance of the aboveground water  
11 conveyance facilities could result in ongoing but periodic postconstruction noise and visual  
12 disturbances that could affect lesser sandhill crane use of surrounding habitat. These effects could  
13 result from periodic vehicle use along the conveyance corridor, inspection and maintenance of  
14 aboveground facilities, and similar activities. These potential effects would be minimized with  
15 implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3.C, *Avoidance and*  
16 *Minimization Measures*.

17 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
18 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
19 crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
20 *Sandhill Crane*). The same methods were employed to addresses the potential noise effects on  
21 cranes from Alternative 1B and to determine that as much as much as 7,746-17,967 acres of crane  
22 habitat could be affected by general construction noise above baseline level (50–60 dBA). This  
23 would include 109 – 576 acres of permanent crane roosting habitat, 904 – 2,078 acres of temporary  
24 crane roosting habitat, and 6,733 – 15,314 acres of crane foraging habitat. In addition, 252 - 950  
25 acres of permanent crane roosting habitat, 471 – 1,623 acres of temporary crane roosting habitat,  
26 and 1,623 – 18,043 acres of crane foraging habitat could be affected by noise from pile driving that  
27 would be above baseline level (50–60dBA, Table 12-1B-32, see Impact BIO-71). The analysis was  
28 conducted based on the assumption that there would be direct line-of-sight from sandhill crane  
29 habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In  
30 many areas the existing levees would partially or completely block the line-of-sight and would  
31 function as effective noise barriers, substantially reducing noise transmission. However, there is  
32 insufficient data to assess the effects that increased noise levels would have on sandhill crane  
33 behavior. Similar acreages of lesser sandhill crane habitat would be expected to be indirectly  
34 affected. However, lesser sandhill cranes are less traditional in their winter roost sites and may be  
35 more likely to travel away from disturbed areas to roost and forage in more suitable habitat.

36 Evening and nighttime construction activities would require the use of extremely bright lights.  
37 Nighttime construction could also result in headlights flashing into roost sites when construction  
38 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
39 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
40 because of their height. Little data is available on the effects of impact of artificial lighting on  
41 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
42 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
43 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
44 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
45 include a reduction in the cranes' quality of nocturnal rest, and effects on their "sense of photo-



1 period which might cause them to shift their physiology towards earlier migration and breeding.”  
2 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes’  
3 overall fitness and reproductive success (which could in turn have population-level impacts). A  
4 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to  
5 forage and might increase their risk of power line collisions if they were to leave roosts before dawn  
6 (BDCP Chapter 5, *Effects Analysis*).

7 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the  
8 implementation of AMM20 (Appendix 3.C, *Avoidance and Minimization Measures*). Activities within  
9 0.75 mile of crane roosting habitat would reduce construction noise during night time hours (from  
10 one hour before sunset to one hour after sunrise) such that construction noise levels do not exceed  
11 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent roosts during periods when the roost  
12 sites are available (flooded). In addition, the area of crane foraging habitat that would be affected  
13 during the day (from one hour after sunrise to one hour before sunset) by construction noise  
14 exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized. Unavoidable noise related effects would be  
15 compensated for by the enhancement of 0.1 acre of foraging habitat for every acre indirectly  
16 affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise contour. With these measures in place,  
17 indirect effects of noise and visual disturbance from construction activities are not expected to  
18 reduce the lesser sandhill crane population in the study area.

19 The use of mechanical equipment during water conveyance facilities construction could cause the  
20 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the  
21 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser  
22 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*  
23 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure  
24 that measures were in place to prevent runoff from the construction area and negative effects of  
25 dust on foraging habitat.

26 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
27 mercury in lesser sandhill crane. Marsh (tidal and nontidal) and floodplain restoration also have the  
28 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
29 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
30 such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that  
31 create newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3,  
32 *Conservation Strategy*, for details of restoration). Increased methylmercury associated with natural  
33 community and floodplain restoration may indirectly affect lesser sandhill crane via uptake in lower  
34 tropic levels (BDCP Appendix 5.D, *Contaminants*). The potential mobilization or creation of  
35 methylmercury within the Plan Area varies with site-specific conditions and would need to be  
36 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
37 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
38 management and monitoring, CM12 would be available to address the uncertainty of  
39 methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill crane. The  
40 potential indirect effects of increased mercury exposure is likely low for sandhill crane for the  
41 following reasons: 1) sandhill cranes occur in the Plan Area only during the nonbreeding winter  
42 months, 2) their primary foraging habitats in the Plan Area are cultivated crops, and 3) the use of  
43 restored tidal wetlands by cranes is likely to be limited compared to seasonal managed wetlands.

44 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
45 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf

1 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
2 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
3 effect of selenium toxicity differs widely between species and also between age and sex classes  
4 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
5 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
15 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
19 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
20 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh  
21 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
22 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
23 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
24 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
25 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
26 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
27 long-term increases in selenium concentrations in water in the Delta under any alternative.  
28 However, it is difficult to determine whether the effects of potential increases in selenium  
29 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to  
30 adverse effects on lesser sandhill crane.

31 Because of the uncertainty that exists at this programmatic level of review, there could be a  
32 substantial effect on lesser sandhill crane from increases in selenium associated with restoration  
33 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
34 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
35 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
36 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
37 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
38 separately for each restoration effort as part of design and implementation. This avoidance and  
39 minimization measure would be implemented as part of the tidal habitat restoration design  
40 schedule.

41 **NEPA Effects:** Crane foraging habitat could be affected by general construction noise (7,746–17,967  
42 acres) and pile driving (2,347–20,616 acres) above baseline level (50–60 dBA). However, lesser  
43 sandhill cranes are less traditional in their winter roost sites and may be more likely to travel away  
44 from disturbed areas to roost in more suitable habitat. Construction in certain areas would take  
45 place 7 days a week and 24 hours a day and evening and nighttime construction activities would

1 require the use of extremely bright lights, which could adversely affect roosting cranes by impacting  
2 their sense of photo-period and by exposing them to predators. The effects of noise and visual  
3 disturbances would be reduced through the implementation of *AMM20 Greater Sandhill Crane*,  
4 which would include requirements (described above) to minimize the effects of noise and visual  
5 disturbance on sandhill cranes. With these measures in place, in addition to AMM1–AMM7, noise  
6 and visual disturbances, the potential for hazardous spills, increased dust and sedimentation, and  
7 operations and maintenance of the water conveyance facilities would not result in an adverse effect  
8 on the lesser sandhill crane. Tidal habitat restoration could result in increased exposure of lesser  
9 sandhill crane to selenium. This effect would be addressed through the implementation of *AMM27*  
10 *Selenium Management*, which would provide specific tidal habitat restoration design elements to  
11 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With  
12 these measures in place, the effects of noise and visual disturbance, potential spills of hazardous  
13 materials, and increased exposure to selenium would not have an adverse effect on lesser sandhill  
14 crane. The implementation of tidal natural communities restoration or floodplain restoration could  
15 result in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects  
16 of increased mercury exposure is likely low for lesser sandhill crane. However, it is unknown what  
17 concentrations of methylmercury are harmful to the species, and the potential for increased  
18 exposure varies substantially within the study area. Site-specific restoration plans that address the  
19 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
20 in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
21 methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill crane. The  
22 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
23 potential for risk of methylmercury exposure for lesser sandhill crane, once site specific sampling  
24 and other information could be developed.

25 **CEQA Conclusion:** Crane foraging habitat could be affected by general construction noise (7,746–  
26 17,967 acres) and pile driving (2,347–20,616 acres) above baseline level (50–60 dBA). However,  
27 lesser sandhill cranes are less traditional in their winter roost sites and may be more likely to travel  
28 away from disturbed areas to roost in more suitable habitat. Construction in certain areas would  
29 take place 7 days a week and 24 hours a day and evening and nighttime construction activities  
30 would require the use of extremely bright lights, which could adversely affect roosting cranes by  
31 impacting their sense of photo-period and by exposing them to predators. The effects of noise and  
32 visual disturbances would be reduced through the implementation of *AMM20 Greater Sandhill Crane*  
33 which would include requirements (described above) to minimize the effects of noise and visual  
34 disturbance on sandhill cranes. The implementation of tidal natural communities restoration or  
35 floodplain restoration could result in increased exposure of lesser sandhill crane to methylmercury.  
36 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane.  
37 However, it is unknown what concentrations of methylmercury are harmful to the species, and the  
38 potential for increased exposure varies substantially within the study area. Site-specific restoration  
39 plans that address the creation and mobilization of mercury, as well as monitoring and adaptive  
40 management as described in *CM12 Methylmercury Management*, would be available to address the  
41 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill  
42 crane. Tidal habitat restoration could result in increased exposure of lesser sandhill crane to  
43 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
44 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
45 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With AMM1–  
46 AMM7 and *AMM27 Selenium Management* in place, in addition to *CM12 Methylmercury Management*,

1 indirect effects of Plan implementation would have a less-than-significant impact on lesser sandhill  
2 crane.

### 3 **Least Bell's Vireo and Yellow Warbler**

4 This section describes the effects of Alternative 1B, including water conveyance facilities  
5 construction and implementation of other conservation components, on the least Bell's vireo and  
6 yellow warbler. Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and  
7 migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that  
8 contain a dense shrub component, including all willow-dominated alliances.

9 Construction and restoration associated with Alternative 1B conservation measures would result in  
10 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as  
11 indicated in Table 12-1B-33. Full implementation of Alternative 1B would also include the following  
12 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler  
13 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 14 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least  
15 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
16 associated with CM7).
- 17 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
18 10 (Objective VFRNC1.2, associated with CM7).
- 19 ● Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 20 ● Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,  
21 associated with CM7).

22 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
23 natural community enhancement and management commitments and implementation of AMM1-  
24 AMM7, *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*  
25 *Cuckoo*, and mitigation to minimize potential effects, impacts on least Bell's vireo and yellow warbler  
26 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated**  
2 **with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Migratory and Breeding	24	24	30	30	NA	NA
<b>Total Impacts CM1</b>		<b>24</b>	<b>24</b>	<b>30</b>	<b>30</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Migratory and Breeding	382	656	88	109	48–85	148
<b>Total Impacts CM2–CM18</b>		<b>382</b>	<b>656</b>	<b>88</b>	<b>109</b>	<b>48–85</b>	<b>148</b>
<b>TOTAL IMPACTS</b>		<b>406</b>	<b>680</b>	<b>118</b>	<b>139</b>	<b>48–85</b>	<b>148</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell’s Vireo**  
5 **and Yellow Warbler**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
7 of up to 819 acres of modeled habitat (680 acres of permanent loss and 139 acres of temporary loss)  
8 for least Bell’s vireo and yellow warbler (Table 12-1B-33). Conservation measures that would result  
9 in these losses are conveyance facilities and transmission line construction, and establishment and  
10 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2),  
11 tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration  
12 (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance  
13 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
14 maintenance activities associated with the long-term operation of the water conveyance facilities  
15 and other BDCP physical facilities could degrade or eliminate least Bell’s vireo and yellow warbler  
16 habitat. Each of these individual activities is described below. A summary statement of the combined  
17 impacts and NEPA effects and a CEQA conclusion follows the individual conservation measure  
18 discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would  
20 result in the combined permanent and temporary loss of up to 54 acres of modeled least Bell’s  
21 vireo and yellow warbler habitat (Table 12-1B-33). Of the 54 acres of modeled habitat that  
22 would be removed for the construction of the conveyance facilities, 24 acres would be a

1 permanent loss and 30 acres would be a temporary loss of habitat. The habitat would be  
2 removed at multiple locations from the north Delta to the east Delta and in the vicinity of Clifton  
3 Court Forebay. Almost all of the losses would occur on the borders of waterways. In the north  
4 Delta, most of the permanent loss would occur where Intakes 1–5 encroach on the Sacramento  
5 River’s east bank between Freeport and Courtland. The riparian areas here are very small  
6 patches, some dominated by valley oak and others by nonnative trees and scrub vegetation. In  
7 the east Delta, small permanent losses would occur from canal construction just south of Twin  
8 Cities Road and just north of Walnut Grove Road. A small area of riparian habitat (mostly  
9 blackberries) would be permanently removed in the south Delta at the new forebay  
10 construction site. The temporary riparian losses would occur at the intake sites along the  
11 Sacramento River and at temporary siphon work areas where the canal would cross Beaver  
12 Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad Canal, and  
13 Middle River just south of Victoria Canal. Tunnel construction at Old River just south of Victoria  
14 Canal would also temporarily remove mixed willows and brambles. There are no occurrences of  
15 least Bell’s vireo or yellow warbler that intersect with the CM1 footprint. Refer to the Terrestrial  
16 Biology Map Book for a detailed view of Alternative 1B construction locations.

- 17 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements  
18 (CM2) would permanently remove approximately 83 acres and temporarily remove 88 acres of  
19 modeled least Bell’s vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is  
20 expected to occur during the first 10 years of Alternative 1B implementation.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
22 inundation would permanently remove an estimated 545 acres of modeled least Bell’s vireo and  
23 yellow warbler habitat.
- 24 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
25 seasonally inundated floodplain would permanently remove approximately 28 acres and  
26 temporarily remove 21 acres of modeled least Bell’s vireo and yellow warbler habitat. Based on  
27 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill  
28 riparian habitat would be restored as a component of seasonally inundated floodplain  
29 restoration actions.

30 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore  
31 may differ from these estimates, depending on how closely the actual outcome of tidal habitat  
32 restoration approximates the assumed outcome. However, riparian restoration from CM4 and  
33 CM5 would increase the extent of least Bell’s vireo and yellow warbler habitat within the Plan  
34 Area once the restored riparian vegetation has developed habitat functions for these species.

- 35 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
36 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
37 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
38 activity would occur along waterway margins where riparian habitat stringers exist, including  
39 levees and channel banks. The improvements would occur within the study area on sections of  
40 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 41 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
42 activities that could be implemented in protected least Bell’s vireo and yellow warbler habitats  
43 are expected to maintain and improve the functions of the habitat over the term of the BDCP.  
44 Least Bell’s vireo and yellow warbler would be expected to benefit from the increase in  
45 protected habitat, which would maintain conditions favorable for future species establishment

1 in the Plan Area. If least Bell's vireo and yellow warbler established breeding populations in  
2 restored riparian habitats in the Plan Area, occupied habitat would be monitored to determine if  
3 there were a need to implement controls on brood parasites (brown-headed cowbird) or nest  
4 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and  
5 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the  
6 stability of newly established populations.

7 Habitat management- and enhancement-related activities could disturb least Bell's vireo and  
8 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment  
9 operation could destroy nests, and noise and visual disturbances could lead to their  
10 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to  
11 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the  
12 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
13 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
14 *Surveys and Avoid Disturbance of Nesting Birds*.

- 15 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
16 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
17 disturbance that could affect least Bell's vireo and yellow warbler use of the surrounding  
18 habitat. Maintenance activities would include vegetation management, levee and structure  
19 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
20 reduced by AMMs and conservation actions as described below.
- 21 ● Injury and Direct Mortality: Although least Bell's vireo nesting has not been confirmed in the  
22 Plan Area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife  
23 Refuge suggest that the reestablishment of a breeding population is a possibility over the  
24 duration of the BDCP. Construction-related activities would not be expected to result in direct  
25 mortality of least Bell's vireo or yellow warbler because adults and fledged young would be  
26 expected to avoid contact with construction and other equipment. However, if either species  
27 were to nest in the construction area, equipment operation, noise and visual disturbances could  
28 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. These  
29 effects on least Bell's vireo would be avoided and minimized with the implementation of *AMM22*  
30 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*.  
31 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*  
32 *of Nesting Birds*, would be available to address effects on nesting yellow warblers.
- 33 ● Temporarily affected areas would be restored as riparian habitat within 1 year following  
34 completion of construction activities. Although the effects are considered temporary, the  
35 restored riparian habitat would require a period of time for ecological succession to occur and  
36 for restored riparian habitat to functionally replace habitat that has been affected. However,  
37 restored riparian vegetation can have the habitat structure to support breeding vireos within 3  
38 to 5 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus  
39 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian  
40 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced  
41 riparian vegetation would be expected to have structural components comparable to the  
42 temporarily removed vegetation within the first 5 to 10 years after the initial restoration  
43 activities are complete.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
3 included.

#### 4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 effects of construction would not be adverse under NEPA. The Plan would remove 524 acres of  
9 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These  
10 effects would result from the construction of the water conveyance facilities (CM1, 54 acres of  
11 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements  
12 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of  
13 habitat).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
15 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
16 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
17 successional valley/foothill riparian habitat. Using these ratios would indicate that 54 acres of  
18 valley/foothill riparian habitat should be restored/created and 54 acres should be protected to  
19 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects  
20 of other conservation actions would remove 470 acres of modeled habitat, and therefore require  
21 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using  
22 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

23 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
24 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
25 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
26 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
27 least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in  
28 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
29 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
30 *Strategy*). This restoration would provide the large contiguous patches needed for suitable least  
31 Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian  
32 restoration also include the restoration, maintenance and enhancement of structural heterogeneity  
33 with adequate vertical and horizontal overlap among vegetation components and over adjacent  
34 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These Plan  
35 objectives represent performance standards for considering the effectiveness of CM7 restoration  
36 and CM3 protection actions. The acres of protection contained in the near-term Plan goals and the  
37 additional detail in the biological objectives for least Bell's vireo satisfy the typical mitigation ratios  
38 that would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of  
39 the other conservation measures. The restored riparian habitat could require 5 years to several  
40 decades, for ecological succession to occur and for restored riparian habitat to functionally replace  
41 habitat that has been affected. However, because the modeled habitat impacted largely consists of  
42 small patches of blackberry, willow, and riparian scrub, and because least Bell's vireo and yellow  
43 warbler are not known to be established breeders in the study area, BDCP actions would not be  
44 expected to have an adverse population-level effect on either species.



1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
7 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
8 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
9 *Measures.* The yellow warbler is not a species that is covered under the BDCP. Although  
10 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
11 in the study area over the course of the BDCP), in order to have a less than adverse effect on  
12 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
13 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to  
14 address adverse effects on nesting yellow warblers.

### 15 **Late Long-Term Timeframe**

16 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
17 habitat for least Bell's vireo and yellow warbler. Alternative 1B as a whole would result in the  
18 permanent loss of and temporary effects on 819 acres of habitat for these species during the term of  
19 the Plan (6% of the total habitat in the study area). These losses would occur from the construction  
20 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*  
21 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The  
22 locations of these losses would be in fragmented riparian habitat throughout the study area.

23 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
24 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
25 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
26 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
27 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
28 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
29 in the Plan for riparian restoration also include the maintenance and enhancement of structural  
30 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
31 the least Bell's vireo and yellow warbler.

32 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
33 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
34 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,  
35 which would also be suitable habitat for the yellow warbler.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
41 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
42 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
43 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
44 *Measures.*

1 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality  
2 of these special-status species under Alternative 1B would represent an adverse effect in the  
3 absence of other conservation actions. However, neither species is an established breeder in the  
4 study area and impacts would likely be limited to loss of migratory habitat. In addition, with habitat  
5 protection and restoration associated with CM3 and CM7, guided by biological goals and objectives  
6 and by *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*  
7 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*  
8 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*  
9 *Reusable Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM22 Suisun*  
10 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* which would be  
11 in place throughout the construction period, the effects of habitat loss and potential mortality on  
12 least Bell's vireo, and the effect of habitat loss on yellow warbler would not be adverse under  
13 Alternative 1B. The yellow warbler is not a species that is covered under the BDCP and the potential  
14 for mortality would be adverse without preconstruction surveys to ensure that nests are detected  
15 and avoided. Mitigation Measure BIO-75 would be available to address this adverse effect.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
20 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
21 the impacts of construction would be less than significant under CEQA. The Plan would remove 524  
22 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term.  
23 These effects would result from the construction of the water conveyance facilities (CM1, 54 acres of  
24 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements  
25 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of  
26 habitat).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
28 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
29 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
30 successional valley/foothill riparian habitat. Using these ratios would indicate that 54 acres of  
31 valley/foothill riparian habitat should be restored/created and 54 acres should be protected to  
32 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects  
33 of other conservation actions would remove 470 acres of modeled habitat, and therefore require  
34 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using  
35 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

36 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
37 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
38 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
39 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
40 least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in  
41 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
42 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
43 *Strategy*). This restoration would provide the large contiguous patches needed for suitable least  
44 Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian

1 restoration also include the restoration, maintenance and enhancement of structural heterogeneity  
2 with adequate vertical and horizontal overlap among vegetation components and over adjacent  
3 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These Plan  
4 objectives represent performance standards for considering the effectiveness of CM7 restoration  
5 and CM3 protection actions. biological goals and objectives would inform the near-term protection  
6 and restoration efforts and represent performance standards for considering the effectiveness of  
7 restoration actions. The acres of protection contained in the near-term Plan goals and the additional  
8 detail in the biological objectives for least Bell's vireo satisfy the typical mitigation ratios that would  
9 be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
10 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
11 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
12 has been affected. However, because the modeled habitat impacted largely consists of small patches  
13 of blackberry, willow, and riparian scrub, and because least Bell's vireo and yellow warbler are not  
14 known to be established breeders in the study area, BDCP actions would not be expected to have an  
15 adverse population-level effect on either species.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
21 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
22 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
23 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
24 *Measures*. The yellow warbler is not a species that is covered under the BDCP. Although  
25 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
26 in the Plan Area over the course of the BDCP), in order to have a less than adverse effect on  
27 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
28 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the  
29 potential impact on nesting yellow warblers to a less-than-significant impact, should they become  
30 established in the Plan Area.

### 31 ***Late Long-Term Timeframe***

32 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
33 habitat for least Bell's vireo and yellow warbler. Alternative 1B as a whole would result in the  
34 permanent loss of and temporary effects on 819 acres of habitat for these species during the term of  
35 the Plan (6% of the total habitat in the study area). These losses would occur from the construction  
36 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4*  
37 *Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The  
38 locations of these losses would be in fragmented riparian habitat throughout the study area.

39 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
40 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
41 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
42 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
43 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
44 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
45 in the Plan for riparian restoration also include the maintenance and enhancement of structural

1 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
2 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to  
3 several decades, for ecological succession to occur and for restored riparian habitat to functionally  
4 replace habitat that has been affected. Therefore, there would be a time-lag before the restored  
5 habitat would benefit either species. However, neither species are established breeders in the study  
6 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow  
7 warbler.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*  
9 *Species*) estimates that the restoration and protection actions discussed above could result in the  
10 restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo, which  
11 would also be suitable habitat for the yellow warbler.

12 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these  
13 special-status species under Alternative 1B would represent an adverse effect in the absence of  
14 other conservation actions. However, neither species is an established breeder in the study area, and  
15 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.  
16 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by  
17 biological goals and objectives and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best*  
18 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*  
19 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*  
20 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge*  
21 *Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
22 *Yellow-Billed Cuckoo*, which would be in place throughout the construction period, the effects of  
23 habitat loss and potential mortality on least Bell's vireo under Alternative 1B would be less than  
24 significant. The yellow warbler is not a species that is covered under the BDCP. Although  
25 preconstruction surveys for least Bell's vireo may also detect nesting yellow warblers, in order for  
26 the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for  
27 noncovered avian species would be required to ensure that yellow warbler nests are detected and  
28 avoided. Mitigation Measure BIO-75 would reduce this potential impact on nesting yellow warblers,  
29 if present in the study area, to a less-than-significant level.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
31 **Disturbance of Nesting Birds**

32 To reduce impacts on nesting birds, DWR will implement the measures listed below.

- 33 • To the maximum extent feasible, vegetation (trees, shrubs, ruderal areas) removal and  
34 trimming will be scheduled during the nonbreeding season of birds (September 1–January  
35 31). If vegetation removal cannot be removed in accordance with this timeframe,  
36 preconstruction/preactivity surveys for nesting birds and additional protective measures  
37 will be implemented as described below.
- 38 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting  
39 surveys before the start of construction. A minimum of three separate surveys will be  
40 conducted within 30 days prior to construction, with the last survey within 3 days prior to  
41 construction. Surveys will include a search of all suitable nesting habitat (trees, shrubs,  
42 ruderal areas, field crops) in the construction area. In addition, a 500-foot area around the  
43 project area will be surveyed for nesting raptors, and a 250-foot buffer area will be surveyed

1 for other nesting birds. If no active nests are detected during these surveys, no additional  
2 measures are required.

- 3 • If active nests are found in the survey area, no-disturbance buffers will be established  
4 around the nest sites to avoid disturbance or destruction of the nest site until the end of the  
5 breeding season (approximately September 1) or until a qualified wildlife biologist  
6 determines that the young have fledged and moved out of the project area (this date varies  
7 by species). A qualified wildlife biologist will monitor construction activities in the vicinity  
8 of the nests to ensure that construction activities do not affect nest success. The extent of the  
9 buffers will be determined by the biologists in coordination with USFWS and CDFW and will  
10 depend on the level of noise or construction disturbance, line-of-sight between the nest and  
11 the disturbance, ambient levels of noise and other disturbances, and other topographical or  
12 artificial barriers. Suitable buffer distances may vary between species.

### 13 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

14 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily  
15 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the  
16 affected habitat's extent and functions. Because there are only two recent occurrences of least Bell's  
17 vireo within the Plan Area, and no occurrences of yellow warbler breeding in the Plan Area, future  
18 occupancy would likely consist of only a small number of individuals, and any such habitat  
19 fragmentation is expected to have no or minimal effect on the species.

20 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the study  
21 area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation  
22 resulting from ground-disturbing operations would not have an adverse effect on least Bell's vireo  
23 or yellow warbler.

24 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the Plan  
25 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation  
26 resulting from ground-disturbing operations would have a less-than-significant impact on least  
27 Bell's vireo or yellow warbler.

### 28 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical** 29 **Transmission Facilities**

30 New transmission lines would increase the risk for bird-power line strikes, which could result in  
31 injury or mortality of least Bell's vireo and yellow warbler. While both species could recolonize the  
32 study area during the permit term, recolonization would be expected to result primarily in response  
33 to BDCP riparian restoration, which would occur largely in CZ 7, which does not overlap with the  
34 proposed footprint for new transmission lines. The lack of occurrences in the study area, the lack of  
35 current and future higher value habitat patches in the vicinity of the proposed transmission lines,  
36 and the behavior and habitat requirements of least Bell's vireo and yellow warbler make collision  
37 with the proposed transmission lines highly unlikely.

38 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse  
39 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is  
40 unlikely due to the lack of occurrences in the study area, the lack of current and future higher value  
41 habitat patches in the vicinity of the proposed transmission lines, and the behavior and habitat  
42 requirements of these species.

1 **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-  
2 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline  
3 strikes is unlikely due to the lack of occurrences in the study area, the lack of current and future  
4 higher value habitat patches in the vicinity of the proposed transmission lines, and the behavior and  
5 habitat requirements of these species.

6 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow**  
7 **Warbler**

8 **Indirect construction-and operation-related effects:** If least Bell's vireo or yellow warbler were  
9 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
10 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
11 functions of suitable nesting habitat for these species. Construction noise above background noise  
12 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
13 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
14 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
15 the extent to which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun*  
16 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce  
17 the potential for adverse effects of construction-related activities on survival and productivity of  
18 nesting least Bell's vireo and a 500 foot no-disturbance buffer would be established around the  
19 active nest. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
20 *Disturbance of Nesting Birds*, would be available to reduce the potential for adverse effects of  
21 construction-related activities on nesting yellow warbler. The use of mechanical equipment during  
22 water conveyance facilities construction could cause the accidental release of petroleum or other  
23 contaminants that could affect least Bell's vireo and yellow warbler in the surrounding habitat. The  
24 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
25 adverse effect on these species. *AMM2 Construction Best Management Practices and Monitoring*  
26 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
27 from the construction area and negative effects of dust on active nests.

28 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
29 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and  
30 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.  
31 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,  
32 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains  
33 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could  
34 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
35 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
36 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
37 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow  
38 warbler, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

39 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
40 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
41 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
42 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
43 adaptive management as described in CM12 would be available to address the uncertainty of  
44 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow  
45 warbler.

1 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,  
2 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be  
3 adverse with the implementation of AMM1-AMM7, and AMM22 *Suisun Song Sparrow, Yellow-*  
4 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*  
5 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
6 address potential effects on nesting yellow warblers. The implementation of tidal natural  
7 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
8 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
9 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
10 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
11 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
12 address the uncertainty of methylmercury levels in restored tidal marsh and potential effects of  
13 methylmercury on least Bell's vireo and yellow warbler.

14 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
15 operations and maintenance of the water conveyance facilities would have a less-than-significant  
16 impact on least Bell's vireo and yellow warbler with the implementation of AMM2 *Construction Best*  
17 *Management Practices and Monitoring, AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
18 *Bell's Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction*  
19 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*. The implementation of tidal natural  
20 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
21 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
22 unknown what concentrations of methylmercury are harmful to these species. Sites-specific  
23 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
24 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
25 address the uncertainty of methylmercury levels in restored tidal marsh and potential impacts on  
26 least Bell's vireo and yellow warbler.

27 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
28 **Disturbance of Nesting Birds**

29 See Mitigation Measure BIO-75 under Impact BIO-75.

30 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**  
31 **Habitat as a Result of Implementation of Conservation Components**

32 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
33 duration of inundation of approximately 48-85 acres of modeled least Bell's vireo and yellow  
34 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,  
35 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat  
36 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and  
37 inundation would be within the tolerance of these vegetation types.

38 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
39 construction of setback levees could result in periodic inundation of up to 148 acres of modeled  
40 least Bell's vireo and yellow warbler habitat in CZ 7. Inundation of restored floodplains would not be  
41 expected to affect least Bell's vireo, yellow warbler, or their habitat because the breeding period is  
42 outside the period when floodplains would likely be inundated. Additionally, periodic inundation of  
43 floodplains would be expected to restore a more natural flood regime in support of riparian

1 vegetation types that support least Bell's vireo and yellow warbler habitat. The overall effect of  
2 seasonal inundation in existing riparian natural communities would be beneficial, because,  
3 historically, flooding was the main natural disturbance regulating ecological processes in riparian  
4 areas, and flooding promotes the germination and establishment of many native riparian plants.

5 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres  
6 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,  
7 periodic effects of inundation would not result in an adverse effect on least Bell's vireo or yellow  
8 warbler because inundation would occur primarily during the nonbreeding season and would  
9 promote a more natural flood regime in support of habitat for these species.

10 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85  
11 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.  
12 However, periodic effects of inundation would have a less-than-significant impact on least Bell's  
13 vireo or yellow warbler because inundation would occur during the nonbreeding season. Flooding  
14 promotes the germination and establishment of many native riparian plants. Therefore, the overall  
15 impact of seasonal inundation in existing riparian natural communities would be beneficial for least  
16 Bell's vireo and yellow warbler.

#### 17 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

18 This section describes the effects of Alternative 1B on Suisun song sparrow and saltmarsh common  
19 yellowthroat. The habitat model used to assess effects for these species is based on primary  
20 breeding habitat and secondary habitat. Suisun song sparrow primary breeding habitat consists of  
21 all *Salicornia*-dominated tidal brackish emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-  
22 dominated tidal freshwater emergent wetland in the Plan Area west of Sherman Island, with the  
23 exception that *Scirpus acutus* and *S. californicus* plant communities (low marsh) and all of the plant  
24 communities listed below that occur in managed wetlands were classified as secondary habitat.  
25 Upland transitional zones, providing refugia during high tides, within 150 feet of the wetland edge  
26 were also included as secondary habitat. Secondary habitats generally provide only a few ecological  
27 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland  
28 transition zones), while primary habitats provide multiple functions, including breeding, effective  
29 predator cover, and valuable forage. Construction and restoration associated with Alternative 1B  
30 conservation measures would result in both temporary and permanent losses of Suisun song  
31 sparrow and saltmarsh common yellowthroat modeled habitat as indicated in Table 12-1B-34. The  
32 majority of the losses would take place over an extended period of time as tidal marsh is restored in  
33 the study area. Full implementation of Alternative 1B would also include the following conservation  
34 actions over the term of the BDCP to benefit the Suisun song sparrow (BDCP Chapter 3, Section 3.3,  
35 *Biological Goals and Objectives*).

- 36 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
37 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
38 with CM4).
- 39 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
40 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- 41 ● Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area  
42 (Objective GNC1.4, associated with CM3)



1 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 2 natural community enhancement and management commitments (including *CM12 Methylmercury*  
 3 *Management*) and implementation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted*  
 4 *Chat*, *Least Bell’s Vireo*, *Western Yellow-Billed Cuckoo*, and mitigation to minimize potential effects,  
 5 impacts on Suisun song sparrow and saltmarsh common yellowthroat would not be adverse for  
 6 NEPA purposes and would be less than significant for CEQA purposes.

7 **Table 12-1B-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled**  
 8 **Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>1,152</b>	<b>3,688</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>1,152</b>	<b>3,688</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

9

10 **Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow**  
 11 **and Saltmarsh Common Yellowthroat**

12 Alternative 1B conservation measures would result in the permanent loss of up to 3,688 acres of  
 13 Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the  
 14 conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres  
 15 of secondary habitat to middle or high marsh (Table 12-1B-34). The only conservation measure that  
 16 would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4*  
 17 *Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11),  
 18 which include ground disturbance or removal of nonnative vegetation, could also result in local  
 19 adverse habitat effects. Each of these individual activities is described below. A summary statement  
 20 of the combined impacts and NEPA effects and a CEQA conclusion follows the individual  
 21 conservation measure discussions.

- 22 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would  
 23 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and  
 24 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-1B-34). In addition, 55 acres of

1 primary habitat would be converted to secondary low marsh, and 123 acres of secondary  
2 habitat would be converted to middle or high marsh. Most areas proposed for removal would be  
3 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and  
4 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately  
5 2% of primary habitat for these species would be converted to foraging habitat. Full  
6 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent  
7 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow  
8 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland  
9 communities that are self-sustaining and not reliant on ongoing management actions necessary  
10 to maintain the existing managed wetland habitats would better ensure the long-term viability  
11 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and  
12 yellowthroat abundance and distribution would be monitored, and the restoration of tidal  
13 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats  
14 until functional habitats were restored (see BDCP Chapter 3, Section 3.4.4, *Conservation Measure 4*  
15 *Tidal Natural Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring*  
16 *Program*).

- 17 ● *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song  
18 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be  
19 expected to reduce predation loss of nests and, consequently, increase and maintain the  
20 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal  
21 habitats over the term of the BDCP. Habitat management- and enhancement-related activities  
22 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located  
23 near work sites. The potential for these activities to have an adverse effect on Suisun song  
24 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*  
25 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure  
26 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
27 would be available to address these effects on saltmarsh common yellowthroat. A variety of  
28 *CM11 Natural Communities Enhancement and Management* habitat management actions that are  
29 designed to enhance wildlife values in restored and protected tidal wetland habitats may result  
30 in localized ground disturbances that could temporarily remove small amounts of Suisun song  
31 sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,  
32 such as removal of nonnative vegetation and road and other infrastructure maintenance  
33 activities, are expected to have minor adverse effects on available species' habitat.
- 34 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
35 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song  
36 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.  
37 Maintenance activities could include vegetation management, and levee repair. These effects,  
38 however, would be reduced by AMMs and conservation actions as described below.
- 39 ● Construction-related activities could result in nest destruction or disturbance resulting in  
40 mortality of eggs and nestlings if restoration activities took place within the nesting period for  
41 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
42 *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation  
43 Measure *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
44 *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,  
45 filling, contouring, and other initial ground-disturbing operations during restoration activities  
46 could temporarily fragment existing modeled tidal brackish emergent wetland habitat for

1 Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the  
2 extent and functions of the affected habitat. These temporary effects would be minimized  
3 through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*  
4 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

5 The following paragraphs summarize the combined effects discussed above and describe other  
6 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are  
7 included.

### 8 ***Near-Term Timeframe***

9 Under Alternative 1B, there would be no impacts resulting from the construction of the water  
10 conveyance facilities (CM1). However, there would be a permanent loss of 1,152 acres of modeled  
11 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in  
12 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging  
13 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would  
14 provide primary nesting habitat for these species. Although there would be a temporal lag in these  
15 conversions, there would be no net loss of primary habitat in the near-term. These effects would  
16 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun  
17 Marsh in CZ 11.

18 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
19 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in  
20 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
21 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be  
22 restored/created to compensate for the near-term losses of Suisun song sparrow and saltmarsh  
23 common yellowthroat habitat.

24 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent  
25 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are  
26 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early  
27 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and  
28 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11  
29 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh  
30 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter  
31 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and  
32 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the  
33 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh  
34 common yellowthroat through the enhancement of degraded areas to provide dense native  
35 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal  
36 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.  
37 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects  
38 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would  
39 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
40 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
41 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and  
42 protection contained in the near-term Plan goals, and the incorporation of the additional measures  
43 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term  
44 effects of tidal restoration.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
7 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The  
8 AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures.* The  
9 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
10 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
11 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for  
12 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests  
13 are detected and avoided. Mitigation Measure BIO-75 would be available to address the effect of  
14 construction activities on nesting saltmarsh common yellowthroat.

### 15 **Late Long-Term Timeframe**

16 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
17 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
18 Alternative 1B as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the  
19 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
20 *Restoration.* Within this habitat loss, 55 acres of primary habitat would be converted to secondary  
21 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

22 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
23 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
24 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
25 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
26 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
27 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
28 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to  
29 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
30 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
31 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
32 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
33 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
34 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
35 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
36 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
37 minimize any temporary, initial loss and fragmentation of habitat.

38 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*  
39 *Species*) estimates that the restoration and protection actions discussed above could result in the  
40 restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to the  
41 protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit the  
42 saltmarsh common yellowthroat.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
4 *Least Bell's Vireo, Western Yellow-Billed Cuckoo. All of these AMMs include elements that would*  
5 *avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and*  
6 *storage sites. The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization*  
7 *Measures.*

8 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and  
9 potential direct mortality of these special status species under Alternative 1B would represent an  
10 adverse effect in the absence of other conservation actions. However, with habitat protection and  
11 restoration associated with CM4, with the management and enhancement actions (CM11), and the  
12 incorporation of the additional measures in the biological goals and objectives, AMMs1–7 and  
13 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*  
14 *which would be in place throughout the construction period, the effects of habitat loss and potential*  
15 *mortality under Alternative 1B on Suisun song sparrow would not be adverse under NEPA, the*  
16 *effects of habitat loss and conversion from Alternative 1B on Suisun song sparrow would not be*  
17 *adverse under NEPA. The saltmarsh common yellowthroat is not a species that is covered under the*  
18 *BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting*  
19 *saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction*  
20 *surveys for noncovered avian species would be required to ensure that saltmarsh common*  
21 *yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be available to*  
22 *address this effect.*

23 **CEQA Conclusion:**

24 **Near-Term Timeframe**

25 Under Alternative 1B, there would be no impacts resulting from the construction of the water  
26 conveyance facilities (CM1). However, there would be a permanent loss of 1,152 acres of modeled  
27 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in  
28 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging  
29 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would  
30 provide primary nesting habitat for these species. Although there would be a temporal lag in these  
31 conversions, there would be no net loss of primary habitat in the near-term. These effects would  
32 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun  
33 Marsh in CZ 11.

34 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
35 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in  
36 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
37 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be  
38 restored/created to mitigate the near-term losses of Suisun song sparrow and saltmarsh common  
39 yellowthroat habitat.

40 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent  
41 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are  
42 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early  
43 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and  
44 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11

1 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh  
2 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter  
3 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and  
4 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the  
5 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh  
6 common yellowthroat through the enhancement of degraded areas to provide dense native  
7 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal  
8 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.  
9 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects  
10 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would  
11 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
12 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
13 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and  
14 protection contained in the near-term Plan goals, and the incorporation of the additional measures  
15 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term  
16 effects of tidal restoration.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
21 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
22 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
23 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The  
24 AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The  
25 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
26 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
27 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for  
28 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests  
29 are detected and avoided. Implementation of Mitigation Measure BIO-75 would reduce the impact of  
30 construction activities on nesting saltmarsh common yellowthroat to a less-than-significant level.

31 Because the number of acres required to meet the typical mitigation ratio described above would be  
32 only 3,590 acres of restored/created tidal natural communities, the 6,000 acres of tidal brackish and  
33 tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland protection  
34 and enhancement contained in the near-term Plan goals, and the additional detail in the biological  
35 objectives for Suisun song sparrow, are more than sufficient to support the conclusion that the near-  
36 term impacts of habitat loss and direct mortality of Suisun song sparrow or saltmarsh common  
37 yellowthroat under Alternative 1B would be less than significant under CEQA.

### 38 ***Late Long-Term Timeframe***

39 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
40 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
41 Alternative 1B as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the  
42 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
43 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary  
44 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

1 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
2 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
3 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
4 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
5 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
6 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
7 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to  
8 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
9 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
10 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
11 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
12 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
13 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
14 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
15 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
16 minimize any temporary, initial loss and fragmentation of habitat.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*  
18 *Species*) estimates that the restoration and protection actions discussed above could result in the  
19 restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to the  
20 protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit the  
21 saltmarsh common yellowthroat.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
27 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
28 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
29 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
30 *Measures*. The saltmarsh common yellowthroat is not a covered species under the BDCP. Although  
31 preconstruction surveys for Suisun song sparrow may detect nesting saltmarsh common  
32 yellowthroat, in order to have a less-than-significant impact on individuals, preconstruction surveys  
33 for noncovered avian species would be required to ensure that saltmarsh common yellowthroat  
34 nests are detected and avoided. Mitigation Measure BIO-75 would reduce this potential impact on  
35 nesting saltmarsh common yellowthroat to a less-than-significant level.

36 Considering these restoration provisions, which would replace low-value secondary habitat with  
37 high-value tidal brackish emergent habitat, including both foraging and primary habitat, and provide  
38 upland refugia for Suisun song sparrow and saltmarsh common yellowthroat, the acreages of  
39 restoration would be sufficient to mitigate habitats lost to construction and restoration activities.  
40 Loss of habitat or direct mortality through implementation of Alternative 1B, with the  
41 implementation of AMM1-AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct Preconstruction*  
42 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not result in a substantial adverse  
43 effect through habitat modifications and would not substantially reduce the number or restrict the  
44 range of the species. Therefore, the loss of habitat or potential mortality under this alternative  
45 would have a less-than-significant impact on Suisun song sparrow and saltmarsh common  
46 yellowthroat.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**  
5           **Saltmarsh Common Yellowthroat**

6           **Indirect construction-related effects:** If Suisun song sparrow or saltmarsh common yellowthroat  
7           were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise  
8           and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
9           functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common  
10          yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,  
11          which could temporarily result in diminished use of habitat. Construction noise above background  
12          noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
13          activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
14          *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
15          the extent to which these noise levels could affect either species. If construction occurred during the  
16          nesting season, these indirect effects could result in the loss or abandonment of nests and mortality  
17          of any eggs and/or nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*  
18          *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
19          *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of  
20          construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh  
21          common yellowthroat by requiring preconstruction surveys and, if nests are present, the  
22          establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical  
23          equipment during water conveyance facilities construction could cause the accidental release of  
24          petroleum or other contaminants that could affect species in the surrounding habitat. The  
25          inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
26          adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. *AMM2 Construction*  
27          *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure  
28          that measures are in place to prevent runoff from the construction area and any adverse effects of  
29          dust on active nests.

30          **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun  
31          Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal  
32          habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase  
33          as a result of water conveyance facilities operations and operations of salinity control gates to mimic  
34          a more natural water flow. This would likely encourage the establishment of tidal wetland plant  
35          communities tolerant of more saline environments, which should have a beneficial effect on Suisun  
36          song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh  
37          habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels  
38          and sloughs in and around Suisun Marsh would be highly variable.

39          **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
40          to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
41          methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
42          tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
43          newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
44          *Strategy*, for details of restoration). Although tidal habitat restoration might increase methylation of



1 mercury export to other habitats, restoration is unlikely to significantly increase the exposure of  
2 methylmercury to Suisun song sparrow or saltmarsh common yellowthroat, as they currently reside  
3 in tidal marshes where elevated methylmercury levels exist. Robinson et al. (2011) found toxic  
4 levels of methylmercury levels in song sparrow populations from southern San Francisco Bay,  
5 although populations near Suisun Marsh (i.e., San Pablo and Simas Creeks) were much lower. The  
6 potential mobilization or creation of methylmercury within the study area varies with site-specific  
7 conditions and would need to be assessed at the project level. The Suisun Marsh Plan anticipates  
8 that restored tidal wetlands would generate less methylmercury than the existing managed  
9 wetlands to be restored (Bureau of Reclamation et al. 2010). *CM12 Methylmercury Management*  
10 includes provisions for project-specific Mercury Management Plans. Along with avoidance and  
11 minimization measures and adaptive management and monitoring, CM12 would be available to  
12 address the uncertainty of methylmercury levels resulting from restored tidal marsh in the study  
13 area.

14 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song  
15 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
16 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
17 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects of  
18 noise and visual disturbance on saltmarsh common yellowthroat. AMM1-AMM7, including *AMM2*  
19 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and  
20 ensure that measures were in place to prevent runoff from the construction area and to avoid  
21 negative effects of dust on the species. Implementation of Operational Scenario A, including  
22 operation of salinity-control gates, and tidal habitat restoration would be expected to increase water  
23 salinity in Suisun Marsh, which would be expected to establish tidal marsh similar to historic  
24 conditions. Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow  
25 and saltmarsh common yellowthroat through increased exposure to methylmercury, as these  
26 species currently reside in tidal marshes where elevated methylmercury levels exist. However, it is  
27 unknown what concentrations of methylmercury are harmful to the species and the potential for  
28 increased exposure varies substantially within the study area. Site-specific restoration plans in  
29 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
30 would address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific  
31 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
32 of methylmercury exposure for these species, once site specific sampling and other information  
33 could be developed.

34 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
35 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
36 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
37 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*, Mitigation Measure BIO-75, *Conduct Preconstruction*  
38 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and *AMM2 Construction Best*  
39 *Management Practices and Monitoring*. Changes in salinity gradients would be expected to have a  
40 beneficial impact on Suisun song sparrow and saltmarsh common yellowthroat through the  
41 establishment of tidal marsh similar to historic conditions. The implementation of tidal natural  
42 communities restoration (CM4) is unlikely to significantly increase the exposure of methylmercury  
43 to Suisun song sparrow or saltmarsh common yellowthroat, as they currently reside in tidal  
44 marshes where elevated methylmercury levels exist. However, it is unknown what concentrations of  
45 methylmercury are harmful to these species. Sites-specific restoration plans that address the  
46 creation and mobilization of mercury, as well as monitoring and adaptive management as described

1 in *CM12 Methylmercury Management*, would better inform potential impacts and address the  
2 uncertainty of methylmercury levels in restored tidal marsh in the study area. With these additional  
3 avoidance and minimization measures, Mitigation Measure BIO-75, and *CM12 Methylmercury*  
4 *Management*, indirect effects of Plan implementation would have a less-than-significant impact on  
5 Suisun song sparrow and saltmarsh common yellowthroat.

6 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
7 **Disturbance of Nesting Birds**

8 See Mitigation Measure BIO-75 under Impact BIO-75.

9 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**  
10 **Associated with Electrical Transmission Facilities**

11 The range of the Suisun song sparrow extends eastward into the study area to approximately  
12 Kimball Island. There are several reported occurrences from Kimball Island, Browns Island, and in  
13 the Suisun Marsh in the western portion of the study area. The easternmost range of the saltmarsh  
14 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable  
15 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment 5J.C,  
16 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current  
17 populations, species ranges, and suitable habitat in the study area make collision with the proposed  
18 transmission lines highly unlikely. Therefore the construction and presence of new transmission  
19 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common  
20 yellowthroat.

21 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
22 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the  
23 current populations, species ranges, and suitable habitat for the species make collision with the  
24 proposed transmission lines highly unlikely.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
26 significant impact on Suisun song sparrow and saltmarsh common yellowthroat because the  
27 location of the current populations, species ranges, and suitable habitat for the species make  
28 collision with the proposed transmission lines highly unlikely.

29 **Swainson's Hawk**

30 This section describes the effects of Alternative 1B, including water conveyance facilities  
31 construction and implementation of other conservation components, on Swainson's hawk. The  
32 habitat model used to assess impacts on Swainson's hawk includes plant alliances and land cover  
33 types associated with Swainson's hawk nesting and foraging habitat. Construction and restoration  
34 associated with Alternative 1B conservation measures would result in both temporary and  
35 permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-1B-35. The majority  
36 of the losses would take place over an extended period of time as tidal marsh is restored in the study  
37 area. Although protection and restoration for the loss of nesting and foraging habitat would be  
38 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)  
39 for restored habitats to replace the functions of habitat lost. This time lag between impacts and  
40 restoration of habitat function would be minimized through specific requirements of *AMM18*  
41 *Swainson's Hawk and White-Tailed Kite*, including transplanting mature trees in the near-term time  
42 period. Full implementation of Alternative 1B would also include the following conservation actions

1 over the term of the BDCP to benefit the Swainson's hawk (BDCP Chapter 3, Section 3.3, *Biological*  
2 *Goals and Objectives*).

- 3 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
4 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
5 associated with CM7)
- 6 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
7 10 (Objective VFRNC1.2, associated with CM3).
- 8 ● Plant and maintain native trees along roadsides and field borders within protected cultivated  
9 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 10 ● Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
11 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11).
- 12 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
13 VPNC2.5, and GNC2.4, associated with CM11).
- 14 ● Conserve at least 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging  
15 habitat (Objective SH1.1, associated with CM3).
- 16 ● Protect at least 42,275 acres of cultivated lands as Swainson's hawk foraging habitat with at  
17 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated  
18 with CM3).
- 19 ● Of the at least 42,275 acres of cultivated lands protected as Swainson's hawk foraging habitat  
20 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface  
21 elevations greater than -1 foot NAVD88 (Objective SH1.3, associated with CM3).
- 22 ● Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson's  
23 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 24 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
25 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 26 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
27 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
28 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
29 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).

30 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
31 management activities that would enhance these natural communities for the species and  
32 implementation of AMM1-AMM7 and AMM18 *Swainson's Hawk and White-tailed Kite*, impacts on  
33 Swainson's hawk would not be adverse for NEPA purposes and would be less than significant for  
34 CEQA purposes.

1 **Table 12-1B-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 1B**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	34	34	23	23	NA	NA
	Foraging	5,494	5,494	9,640	9,640	NA	NA
<b>Total Impacts CM1</b>		<b>5,528</b>	<b>5,528</b>	<b>9,663</b>	<b>9,663</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	252	412	54	85	41–70	189
	Foraging	8,903	48,511	504	1,540	3,025–6,635	8,008
<b>Total Impacts CM2–CM18</b>		<b>9,155</b>	<b>48,923</b>	<b>558</b>	<b>1,625</b>	<b>3,066–6,705</b>	<b>8,197</b>
<b>Total Nesting</b>		<b>286</b>	<b>446</b>	<b>77</b>	<b>108</b>	41–70	189
<b>Total Foraging</b>		<b>14,397</b>	<b>54,005</b>	<b>10,144</b>	<b>11,180</b>	3,025–6,635	8,008
<b>TOTAL IMPACTS</b>		<b>14,683</b>	<b>54,451</b>	<b>10,221</b>	<b>11,288</b>	<b>3,066–6,705</b>	<b>8,197</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
6 of up to 65,739 acres of modeled habitat (554 acres of nesting habitat and 65,185 acres of foraging  
7 habitat) for Swainson’s hawk (Table 12-1B-35). Conservation measures that would result in these  
8 losses are conveyance facilities and transmission line construction, and establishment and use of  
9 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
10 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),  
11 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
12 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
13 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
14 In addition, maintenance activities associated with the long-term operation of the water conveyance  
15 facilities and other BDCP physical facilities could affect Swainson’s hawk modeled habitat. Each of  
16 these individual activities is described below. A summary statement of the combined impacts and  
17 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B water conveyance facilities  
19 would result in the combined permanent and temporary loss of up to 54 acres of Swainson’s  
20 hawk nesting habitat (34 acres of permanent loss and 23 acres of temporary loss). The habitat  
21 would be removed at multiple locations from the north Delta to the east Delta and in the vicinity

of Clifton Court Forebay. Almost all of the losses would occur on the borders of waterways. In the north Delta, most of the permanent loss would occur where Intakes 1–5 encroach on the Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very small patches, some dominated by valley oak and others by nonnative trees and scrub vegetation. Other small patches or narrow bands of riparian vegetation dominated by valley oak, willow, cottonwood or mixed brambles would be permanently removed by canal construction adjacent to Intake 1, between Intakes 2 and 4, and just south of Lambert Road. In the east Delta, small permanent losses would occur from canal construction just south of Twin Cities Road and just north of Walnut Grove Road. The temporary riparian losses would occur at the intake sites along the Sacramento River and at temporary siphon work areas where the canal would cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad Canal, and Middle River just south of Victoria Canal.

In addition, 15,134 acres of foraging habitat would be removed (5,494 acres of permanent loss and 9,640 acres of temporary loss; Table 12-1B-36). Permanent foraging habitat impacts from CM1 include 1,678 acres of impact on very high-value foraging habitat (alfalfa; Table 12-1B-36). The permanent and temporary losses would occur at various locations along the new canal route from the construction of the canal and the associated borrow and spoil sites and at the intake sites along the Sacramento River. Permanent and temporary losses of foraging habitat would also occur at the new forebay site just south of Clifton Court Forebay and associated borrow and spoil sites. There are 12 occurrences of Swainson’s hawk that intersect with the permanent construction footprint for CM1. In addition, 13 occurrences intersect with temporary impacts from the CM1 footprint. The implementation of AMM18 Swainson’s Hawk and White-Tailed Kite, would require pre-construction surveys and the establishment of no-disturbance buffers and would minimize potential effects on nesting Swainson’s hawks present within or adjacent to construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.

**Table 12-1B-36. Acres of Impacted Swainson’s Hawk Foraging Habitat by Value Classes**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2–CM18 Permanent (temporary)
Very high	Alfalfa hay	1,678 (3,365)	12,002 (345)
Moderate	Irrigated pasture, other hay crops	1,823 (2,234)	24,865 (642)
Low	Other irrigated field and truck/berry crops	549 (891)	5,911 (313)
Very low	Safflower, sunflower, corn, grain sorghum	1,443 (3,150)	5,732 (241)

- CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement would result in the combined permanent and temporary loss of up to 133 acres of nesting habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554 acres of temporary loss). Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the riparian losses would occur at the north end of Yolo Bypass where major fish passage improvements are planned. Excavation to improve water movement in the Toe Drain and in the

1 Sacramento Weir would also remove Swainson's hawk habitat. The loss is expected to occur  
2 during the first 10 years of Plan implementation.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
4 inundation would permanently remove an estimated 295 acres of Swainson's hawk nesting  
5 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of  
6 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
7 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
8 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
9 directly impact and fragment grassland just north of Rio Vista in and around French and  
10 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
11 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
12 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of  
13 10,757 acres of very high-value (alfalfa), 18,565 acres of moderate-value, and 4,098 acres of  
14 low-value habitat (See Table 12-1B-36 for land cover types classified by habitat value). Because  
15 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce  
16 the use of remaining cultivated lands or preclude access to surrounding lands. However, the  
17 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal  
18 restoration footprints could result in the removal or abandonment of nesting territories that  
19 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree  
20 mortality would be expected over time as areas became tidally inundated. Depending on the  
21 extent and value of remaining habitat, this could reduce the local nesting population. There are  
22 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for  
23 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal  
24 restoration activities.
- 25 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
26 seasonally inundated floodplain and riparian restoration actions would remove approximately  
27 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary  
28 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of  
29 temporary loss). These losses would be expected after the first 10 years of Alternative 1B  
30 implementation along the San Joaquin River and other major waterways in CZ 7.
- 31 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
32 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and  
33 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27  
34 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 35 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
36 implemented on agricultural lands and would result in the conversion of 1,849 acres of  
37 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,  
38 and 11. If agricultural lands supporting higher value foraging habitat than the restored  
39 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 40 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
41 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and  
42 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may  
43 develop along the margins of restored nontidal marsh if appropriate site conditions are present.
- 44 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
45 enhancement-related activities could disturb Swainson's hawk nests if they were present near

1 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
2 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
3 remove small amounts of Swainson's hawk habitat and reduce the functions of habitat until  
4 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation  
5 and road and other infrastructure maintenance, are expected to have minor effects on available  
6 Swainson's hawk habitat and are expected to result in overall improvements to and  
7 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but  
8 are expected to be minimal and would be avoided and minimized by the AMMs listed below.  
9 CM11 would also include the construction of recreational-related facilities including trails,  
10 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*  
11 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
12 etc. would be placed on existing, disturbed areas when and where possible. However,  
13 approximately 50 acres of Swainson's hawk grassland foraging habitat would be lost from the  
14 construction of trails and facilities.

- 15 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
16 Swainson's hawk foraging habitat for the development of a delta and longfin smelt conservation  
17 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

18 Permanent and temporary nesting habitat losses from the above conservation measures, would  
19 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat  
20 would be restored as riparian habitat within 1 year following completion of construction  
21 activities. The restored riparian habitat would require 1 to several decades to functionally  
22 replace habitat that has been affected and for trees to attain sufficient size and structure suitable  
23 for nesting by Swainson's hawks. *AMM18 Swainson's Hawk and White-Tailed Kite* contains  
24 actions described below to reduce the effect of temporal loss of nesting habitat, including the  
25 transplanting of mature trees and planting of trees near high-value foraging habitat. The  
26 functions of cultivated lands and grassland communities that provide foraging habitat for  
27 Swainson's hawk are expected to be restored relatively quickly.

- 28 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
30 disturbances that could affect Swainson's hawk use of the surrounding habitat. Maintenance  
31 activities would include vegetation management, levee and structure repair, and re-grading of  
32 roads and permanent work areas. These effects, however, would be reduced by AMM1-AMM7  
33 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
34 described below.

- 35 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
36 direct mortality of adult or fledged Swainson's hawk if they were present in the Plan Area,  
37 because they would be expected to avoid contact with construction and other equipment.  
38 However, if Swainson's hawk were to nest in the construction area, construction-related  
39 activities, including equipment operation, noise and visual disturbances could affect nests or  
40 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
41 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
42 *Tailed Kite* into the BDCP.

43 The following paragraphs summarize the combined effects discussed above and describe other  
44 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
45 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
5 the effect of construction would not be adverse under NEPA. The Plan would remove 363 acres (286  
6 permanent, 77 temporary) of Swainson's hawk nesting habitat in the study area in the near-term.  
7 These effects would result from the construction of the water conveyance facilities (CM1, 57 acres),  
8 and implementing other conservation measures (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal  
9 Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7  
10 Riparian Natural Community Restoration—306 acres). In addition, 24,451 acres of Swainson's hawk  
11 foraging habitat would be removed or converted in the near-term (CM1, 15,134 acres; CM2 Yolo  
12 Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5, Seasonally  
13 Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland  
14 Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,  
15 CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—  
16 9,407 acres).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
18 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of  
19 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
20 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 57  
21 acres of nesting habitat should be restored/ created and 57 acres should be protected to  
22 compensate for the CM1 losses of Swainson's hawk nesting habitat. In addition, 15,134 acres of  
23 foraging habitat should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat.  
24 The near-term effects of other conservation actions would remove 306 acres of modeled nesting  
25 habitat, and therefore require 306 acres of restoration and 306 acres of protection of nesting  
26 habitat. Similarly, the near-term effects of other conservation actions would remove 9,407 acres of  
27 modeled foraging habitat, and therefore require 9,407 acres of protection of foraging habitat using  
28 the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting  
29 habitat; 1:1 protection for the loss of foraging habitat).

30 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
31 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
32 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
33 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
34 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These  
35 conservation actions are associated with CM3, CM5, CM7, and CM8, and would occur in the same  
36 timeframe as the construction and early restoration losses.

37 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
38 system with extensive wide bands or large patches of valley/foothill riparian natural community  
39 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
40 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
41 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
42 increased by planting and maintaining native trees along roadsides and field borders within  
43 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
44 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be



1 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
2 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

3 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
4 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
5 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
6 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
7 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
8 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
9 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
10 Foraging opportunities would also be improved by enhancing prey populations through the  
11 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
12 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
13 would also be protected and maintained as part of the cultivated lands reserve system which would  
14 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
15 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
16 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
17 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
18 would inform the near-term protection and restoration efforts and represent performance  
19 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated  
20 lands that provide habitat for covered and other native wildlife species would be protected in the  
21 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the  
22 late long-term time period would be in very high- and high-value crop types for Swainson's hawk  
23 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated  
24 lands protected in the near-term time period which would provide high-value habitat for Swainson's  
25 hawk. The acres of restoration and protection contained in the near-term Plan goals and the  
26 additional detail in the biological objectives satisfy the typical mitigation that would be applied to  
27 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-  
28 term effects of the other conservation measures.

29 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
30 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
31 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
32 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
33 require one to several decades to functionally replace habitat that has been affected and for trees to  
34 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
35 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
36 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
37 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
38 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
39 would further reduce this limited resource and could reduce or restrict the number of active  
40 Swainson's hawk nests within the Plan Area until restored riparian habitat is sufficiently developed.

41 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
42 trees, including transplanting trees scheduled for removal. These would be supplemented with  
43 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
44 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
45 In addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve  
46 system for every tree anticipated to be removed by construction during the near-term period that

1 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
2 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
3 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
4 in clumps of at least 3 trees each at appropriate sites within or adjacent to conserved cultivated  
5 lands, or they could be incorporated as a component of the riparian restoration (CM5, CM7) where  
6 they are in close proximity to suitable foraging habitat. Replacement trees that were incorporated  
7 into the riparian restoration would not be clustered in a single region of the study area, but would  
8 be distributed throughout the lands protected as foraging habitat for Swainson's hawk.

9 To enhance Swainson's hawk and reproductive output until the replacement nest trees become  
10 suitable for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected  
11 in the near-term for each potential nest site removed (a nest site is defined as a 125-acre block in  
12 which more than 50% of nest trees are 20 feet or greater in height) as a result of construction  
13 activity during the near-term. The foraging habitat to be protected would be within 6 kilometers of  
14 the removed tree within an otherwise suitable foraging landscape and on land not subject to threat  
15 of seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
16 value of the land. With this program in place, Alternative 1B would not have a substantial adverse  
17 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
18 habitat modifications.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 26 ***Late Long-Term Timeframe***

27 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
28 modeled foraging habitat for Swainson's hawk. Alternative 1B as a whole would result in the  
29 permanent loss of and temporary effects on 554 acres of potential nesting habitat (6% of the  
30 potential nesting habitat in the study area) and 65,185 acres of foraging habitat (14% of the foraging  
31 habitat in the study area).

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
33 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
34 *Restoration*, and *CM8 Grassland Natural Community Restoration* to restore or create at least 5,000  
35 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
36 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
37 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed  
38 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
39 species (Table 3-4 in Chapter 3).

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
41 system with extensive wide bands or large patches of valley/foothill riparian natural community  
42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
43 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
44 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within  
2 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
3 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
10 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
11 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
12 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
13 Foraging opportunities would also be improved by enhancing prey populations through the  
14 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
15 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would  
16 also be protected and maintained as part of the cultivated lands reserve system which would  
17 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
18 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
19 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
20 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
21 would inform the near-term protection and restoration efforts and represent performance  
22 standards for considering the effectiveness of restoration actions. Foraging habitat would be  
23 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that  
24 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which  
25 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
31 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
32 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

33 **NEPA Effects:** The loss of Swainson's hawk habitat and potential for direct mortality of this special-  
34 status species under Alternative 1B would represent an adverse effect in the absence of other  
35 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
36 CM9, and CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*  
37 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
38 the effects of habitat loss and potential mortality on Swainson's hawk under Alternative 1B would  
39 not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
5 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
6 the effect of construction would be less than significant under CEQA. The Plan would remove 363  
7 acres (286 permanent, 77 temporary) of Swainson's hawk nesting habitat in the study area in the  
8 near-term. These effects would result from the construction of the water conveyance facilities (CM1,  
9 57 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
10 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*  
11 *Riparian*, and *CM7 Natural Community Restoration*—306 acres). In addition, 24,451 acres of  
12 Swainson's hawk foraging habitat would be removed or converted in the near-term (CM1, 15,134  
13 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5*  
14 *Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*  
15 *Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
16 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*  
17 *Hatcheries*—9,407 acres).

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
19 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of  
20 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
21 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 57  
22 acres of nesting habitat should be restored/ created and 57 acres should be protected to  
23 compensate for the CM1 losses of Swainson's hawk nesting habitat. In addition, 15,134 acres of  
24 foraging habitat should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat.  
25 The near-term effects of other conservation actions would remove 306 acres of modeled nesting  
26 habitat, and therefore require 306 acres of restoration and 306 acres of protection of nesting  
27 habitat. Similarly, the near-term effects of other conservation actions would remove 9,407 acres of  
28 modeled foraging habitat, and therefore require 9,407 acres of protection of foraging habitat using  
29 the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting  
30 habitat; 1:1 protection for the loss of foraging habitat).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
32 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
33 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
34 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
35 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These  
36 conservation actions are associated with CM3, CM5, CM7, and CM8, and would occur in the same  
37 timeframe as the construction and early restoration losses.

38 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
39 system with extensive wide bands or large patches of valley/foothill riparian natural community  
40 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
41 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
42 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
43 increased by planting and maintaining native trees along roadsides and field borders within  
44 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small

1 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
2 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
3 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
5 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
6 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
7 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
8 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
9 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
10 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
11 Foraging opportunities would also be improved by enhancing prey populations through the  
12 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
13 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
14 would also be protected and maintained as part of the cultivated lands reserve system which would  
15 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
16 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
17 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
18 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
19 would inform the near-term protection and restoration efforts and represent performance  
20 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated  
21 lands that provide habitat for covered and other native wildlife species would be protected in the  
22 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the  
23 late long-term time period would be in very high- and high-value crop types for Swainson's hawk  
24 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated  
25 lands protected in the near-term time period which would provide high-value habitat for Swainson's  
26 hawk. The acres of restoration and protection contained in the near-term Plan goals and the  
27 additional detail in the biological objectives satisfy the typical mitigation that would be applied to  
28 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-  
29 term effects of the other conservation measures.

30 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
31 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
32 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
33 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
34 require one to several decades to functionally replace habitat that has been affected and for trees to  
35 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
36 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
37 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
38 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
39 trees, and ornamental trees near rural residences and the removal of nest trees or nesting habitat  
40 would further reduce this limited resource and could reduce or restrict the number of active  
41 Swainson's hawk within the Plan Area until restored riparian habitat is sufficiently developed.

42 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
43 trees, including transplanting trees scheduled for removal. These would be supplemented with  
44 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
45 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
46 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve

1 system for every tree anticipated to be removed by construction during the near-term period that  
2 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
3 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
4 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
5 in clumps of at least three trees each at appropriate sites within or adjacent to conserved cultivated  
6 lands, or they may be incorporated as a component of the riparian restoration (CM5, CM7) where  
7 they are in close proximity to suitable foraging habitat. Replacement trees that are incorporated into  
8 the riparian restoration would not be clustered in a single region of the Plan Area, but would be  
9 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

10 To enhance Swainson's hawk reproductive output until the replacement nest trees become suitable  
11 for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected in the  
12 near-term for each potential nest site removed (a nest site is defined as a 125-acre block in which  
13 more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity  
14 during the near-term. The foraging habitat to be protected would be within 6 kilometers of the  
15 removed tree within an otherwise suitable foraging landscape and on land not subject to threat of  
16 seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
17 value of the land. With this program in place, Alternative 1B would not have a substantial adverse  
18 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
19 habitat modifications.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
25 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
26 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 27 **Late Long-Term Timeframe**

28 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
29 modeled foraging habitat for Swainson's hawk. Alternative 1B as a whole would result in the  
30 permanent loss of and temporary effects on 554 acres of potential nesting habitat (6% of the  
31 potential nesting habitat in the study area) and 65,185 acres of foraging habitat (14% of the foraging  
32 habitat in the study area).

33 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
34 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
35 *Restoration*, and *CM8 Grassland Natural Community Restoration*, to restore or create at least 5,000  
36 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
37 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
38 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed  
39 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
40 species (Table 3-4 in Chapter 3).

41 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
42 system with extensive wide bands or large patches of valley/foothill riparian natural community  
43 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
44 restoration would expand the patches of existing riparian forest in order to support nesting habitat

1 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
2 increased by planting and maintaining native trees along roadsides and field borders within  
3 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
4 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
5 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
6 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

7 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
8 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
9 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
10 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
11 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
12 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
13 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
14 Foraging opportunities would also be improved by enhancing prey populations through the  
15 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
16 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would  
17 also be protected and maintained as part of the cultivated lands reserve system which would  
18 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
19 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
20 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
21 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
22 would inform the near-term protection and restoration efforts and represent performance  
23 standards for considering the effectiveness of restoration actions. Foraging habitat would be  
24 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of Swainson's hawk foraging  
25 habitat would be protected within of the 45,405 acres of cultivated lands protected by the late long-  
26 term, 50% of which would be in very high-value habitat production in CZs 1-4, 7- 9, and 11  
27 (Objective SH1.2).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

35 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
36 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
37 restoring riparian and foraging habitats lost to construction and restoration activities, and  
38 implementation of *AMM1-AMM7* and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
39 habitat or direct mortality through implementation of Alternative 1B would not result in a  
40 substantial adverse effect through habitat modifications and would not substantially reduce the  
41 number or restrict the range of the species. Therefore, the loss of habitat or potential mortality  
42 under this alternative would have a less-than-significant impact on Swainson's hawk.

1       **Impact BIO-84: Effects on Swainson’s Hawk Associated with Electrical Transmission Facilities**

2       New transmission lines would increase the risk that Swainson’s hawks could be subject to power  
3       line strikes, which could result in injury or mortality of Swainson’s hawks. This species would be at  
4       low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis  
5       (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).  
6       Factors analyzed include the height of the new transmission lines and the flight behavior of the  
7       species. The existing network of transmission lines in the Plan Area currently poses the same small  
8       risk for Swainson’s hawk, and any incremental risk associated with the new power line corridors  
9       would also be expected to be low. *AMM20 Greater Sandhill Crane*, would further reduce any potential  
10      effects.

11      **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson’s hawk power  
12      line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the  
13      construction of new transmission lines on Swainson’s hawk would not be adverse.

14      **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson’s hawk  
15      power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential impact of the  
16      construction of new transmission lines on Swainson’s hawk to a less-than-significant level.

17      **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson’s Hawk**

18      Noise and visual disturbances from the construction of water conveyance facilities and other  
19      conservation measures could reduce Swainson’s hawk use of modeled habitat adjacent to work  
20      areas. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900  
21      to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
22      *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
23      are no available data to determine the extent to which these noise levels could affect Swainson’s  
24      hawk. Moreover, operation and maintenance of the water conveyance facilities, including the  
25      transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
26      affect Swainson’s hawk use of the surrounding habitat. These construction activities would include  
27      water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont  
28      Weir/Yolo Bypass Enhancements. Swainson’s hawks are seasonally abundant across much of the  
29      study area wherever adequate nest trees occur within a cultivated landscape that supports suitable  
30      foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP  
31      actions to temporarily displace Swainson’s hawks and temporarily reduce the use of suitable habitat  
32      adjacent to construction areas. These adverse effects would be minimized with the implementation  
33      of *AMM18 Swainson’s Hawk and White-Tailed Kite*.

34      The use of mechanical equipment during water conveyance facilities construction could cause the  
35      accidental release of petroleum or other contaminants that could affect Swainson’s hawk foraging in  
36      the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
37      suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*  
38      *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that  
39      measures are in place to prevent runoff from the construction area and negative effects of dust on  
40      habitat.

41      **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
42      could reduce Swainson’s hawk use of modeled habitat adjacent to work areas. Moreover, operation  
43      and maintenance of the water conveyance facilities, including the transmission facilities, could result



1 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the  
2 surrounding habitat. The effects of noise, the potential for hazardous spills, increased dust and  
3 sedimentation, and operations and maintenance of the water conveyance facilities would not have  
4 an adverse effect on Swainson's hawk with the implementation of AMM1-AMM7, and *AMM18*  
5 *Swainson's Hawk and White-Tailed Kite*.

6 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
7 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,  
8 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
9 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's  
10 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,  
11 increased dust and sedimentation, and operations and maintenance of the water conveyance  
12 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation  
13 of AMM1-AMM7, and *AMM18 Swainson's Hawk and White-Tailed Kite*.

#### 14 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging** 15 **Habitat as a Result of Implementation of Conservation Components**

16 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
17 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-  
18 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41-70 acres of  
19 nesting habitat and 3,025-6,635 acres of foraging habitat; Table 12-1B-36). However, project-  
20 associated inundation of areas that would not otherwise have been inundated would be expected to  
21 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining  
22 estimated 70% of all years, and during those years notch operations would not typically affect the  
23 maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
24 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat  
25 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass  
26 operations. However, increased duration of inundation during years of Fremont Weir operation,  
27 may delay the period for which foraging habitat is available to Swainson's hawks by up to several  
28 weeks.

29 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
30 *Restoration* could result in the periodic inundation of up to approximately 8,197 acres of modeled  
31 Swainson's hawk habitat (Table 12-1B-35), consisting of 189 acres of nesting and 8,008 acres of  
32 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime  
33 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.  
34 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)  
35 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated  
36 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of  
37 available foraging habitat due to the reduction in available prey. Inundated habitats would be  
38 expected to recover following draw-down and provide suitable foraging conditions until the  
39 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely  
40 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

41 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
42 sites because trees in which nest sites are situated already withstand floods, the increase in  
43 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
44 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically

1 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.  
2 This would be considered a short-term effect that would not result in an adverse effect on  
3 Swainson's hawk.

4 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
5 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
6 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
7 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
8 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.  
9 This would be considered a short-term effect that would not have a significant impact on Swainson's  
10 hawk.

### 11 **Tricolored Blackbird**

12 This section describes the effects of Alternative 1B, including water conveyance facilities  
13 construction and implementation of other conservation components, on tricolored blackbird. The  
14 habitat model used to assess effects for tricolored blackbird is based on breeding habitat and  
15 nonbreeding habitat. Although nesting colonies have been documented along the fringe of Suisun  
16 Marsh, in the Yolo Bypass and along the southwestern perimeter of the Plan Area, breeding colonies  
17 are uncommon in the Plan Area. Modeled breeding habitat includes bulrush/cattail wetlands and  
18 shrub communities that may provide suitable nesting substrate, and adjacent high-value foraging  
19 areas that occur within 5 miles of nesting colonies documented in the Plan Area. The foraging  
20 component includes cultivated lands and noncultivated land cover types known to support  
21 abundant insect populations such as grasslands, pasturelands (including alfalfa), natural seasonal  
22 wetlands, and sunflower croplands. The Delta is recognized as a major wintering area for tricolored  
23 blackbird (Hamilton 2004, Beedy 2008). Modeled nonbreeding habitat includes emergent wetlands  
24 and shrub stands that provide suitable roosting habitat, as well as cultivated lands and  
25 noncultivated lands that provide foods sought by tricolored blackbirds during the winter. Outside of  
26 the breeding season, tricolored blackbirds are primarily granivores that forage opportunistically  
27 across the Plan Area in grasslands, pasturelands, croplands, dairies, and livestock feed lots. Factors  
28 considered in assessing the value of affected habitat for the tricolored blackbird, include patch size,  
29 suitability of vegetation, and proximity to recorded occurrences.

30 Construction and restoration associated with Alternative 1B conservation measures would result in  
31 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table  
32 12-1B-37. Full implementation of Alternative 1B would also include the following conservation  
33 actions over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3,  
34 *Biological Goals and Objectives*).

- 35 ● Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)  
36 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs  
37 1, 2, 8, or 11. (Objective TRBL1.1).
- 38 ● Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as  
39 nonbreeding foraging habitat, 50% of which is of high or very high value (Objective TRBL1.2).
- 40 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles  
41 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat  
42 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of which will be within 5 miles of the at least 50  
43 acres of nesting habitat protected under Objective TRBL1.1 (Objective TRBL1.3).

- 1       ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
2       lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
3       borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
4       grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 5       ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
6       acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
7       among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 8       ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 9       ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
10      complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 11     ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
12      VPNC2.5, and GNC2.4, associated with CM11).

13      As explained below, with the restoration or protection of these amounts of habitat, in addition to  
14      management activities that would enhance these natural communities for the species and  
15      implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird  
16      would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-37. Changes to Tricolored Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	7	7	3	3	NA	NA
		Foraging - cultivated	1,005	1,005	1,197	1,197	NA	NA
		Foraging - noncultivated	198	198	183	183	NA	NA
	Nonbreeding	Roosting	16	16	35	35	NA	NA
		Foraging - cultivated	2,993	2,993	6,032	6,032	NA	NA
		Foraging - noncultivated	202	202	175	175	NA	NA
<b>Total Impacts CM1</b>		<b>4,421</b>	<b>4,421</b>	<b>7,625</b>	<b>7,625</b>			
CM2-CM18	Breeding	Nesting	13	72	75	77	11-26	30
		Foraging - cultivated	1,657	9,525	84	359	1,837-2,598	2,124
		Foraging noncultivated	704	1,991	155	184	600-1,689	355
	Nonbreeding	Roosting	570	1,642	0	1	0-4	29
		Foraging - cultivated	3,747	23,955	54	420	222-1,057	2,506
		Foraging - noncultivated	459	1,341	0	3	42-191	158
<b>Total Impacts CM2-CM18</b>		<b>7,150</b>	<b>38,526</b>	<b>368</b>	<b>1,044</b>	<b>2,711</b>	<b>5,766</b>	
<b>Total Breeding</b>		<b>3,584</b>	<b>12,798</b>	<b>1,697</b>	<b>2,003</b>	<b>2,447-4,312</b>	<b>2,509</b>	
<b>Total Nonbreeding</b>		<b>7,987</b>	<b>30,149</b>	<b>6,296</b>	<b>6,666</b>	<b>263-1,252</b>	<b>2,694</b>	
<b>TOTAL IMPACTS</b>		<b>11,571</b>	<b>42,947</b>	<b>7,993</b>	<b>8,669</b>	<b>2,711</b>	<b>5,766</b>	

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

## 1 **Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird**

2 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
3 of up to 51,616 acres of modeled habitat (14,801 acres of breeding habitat and up to 36,815 acres of  
4 nonbreeding habitat) for tricolored blackbird (Table 12-1B-37). Conservation measures that would  
5 result in these losses are conveyance facilities and transmission line construction, and establishment  
6 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
7 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration  
8 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat  
9 enhancement and management activities (CM11), which include ground disturbance or removal of  
10 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
11 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
12 facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities  
13 is described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
14 conclusion follow the individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would  
16 result in the permanent loss of 1,210 acres of tricolored blackbird breeding habitat (7 acres  
17 nesting habitat, 1,005 acres of cultivated lands, and 198 acres of noncultivated lands suitable for  
18 foraging) and 3,211 acres of nonbreeding habitat (16 acres roosting habitat, 2,993 acres of  
19 cultivated lands, and 202 acres of noncultivated lands suitable for foraging; Table 12-1B-37). In  
20 addition, 1,383 acres of breeding habitat (3 acres of roosting, 1,197 acres of cultivated lands, and  
21 183 acres of noncultivated lands suitable for foraging) and 6,242 acres of nonbreeding habitat  
22 (35 acres of roosting, 6,032 acres of cultivated lands, and 175 acres of noncultivated lands  
23 suitable for foraging) would be temporarily removed. Most of the habitat that would be lost is  
24 located in the central Delta, from CZs 3-6 and CZ 8. Nesting and roosting habitat would be  
25 removed as a result of the construction of the canal, and temporary work areas associated with  
26 construction. Foraging habitat losses would occur along the canal alignment primarily from the  
27 construction of the canal and the associated borrow and spoil sites. Foraging habitat would also  
28 be lost as a result of the construction of the new forebay in CZ 8. There are no occurrences of  
29 tricolored blackbird that overlap with the construction footprint for CM1. However, records  
30 exist throughout the study area. The implementation of *AMM21 Tricolored Blackbird* (BDCP  
31 Appendix 3.C, *Avoidance and Minimization Measures*) would minimize potential effects on  
32 tricolored blackbirds if they were to nest adjacent to construction areas. Refer to the Terrestrial  
33 Biology Map Book for a detailed view of Alternative 1B construction locations.
- 34 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries  
35 improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird  
36 breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of  
37 noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting  
38 entirely of roosting habitat). In addition, CM2 construction would result in the temporary  
39 removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands,  
40 and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat  
41 (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of  
42 Plan implementation.
- 43 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result  
44 in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21  
45 acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable  
46 for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of

1 cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated  
2 13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal  
3 emergent wetland communities that could provide nonbreeding season roosting habitat for  
4 tricolored blackbirds, depending on future vegetation density and composition. Conversion  
5 would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34  
6 acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated  
7 habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated  
8 lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and  
9 conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent  
10 loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop  
11 into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored  
12 blackbird.

- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration  
14 associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent  
15 removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,  
16 503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and  
17 656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3  
18 acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub  
19 associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat  
20 managed as early- to mid-successional habitats (as a component of CM5) could provide suitable  
21 nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have  
22 developed habitat functions for the species.
- 23 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland would result in the  
24 permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding  
25 habitat. Grassland restoration would be implemented on cultivated lands and would therefore  
26 result in the conversion of tricolored blackbird cultivated foraging habitat to high-value  
27 grassland foraging habitat in CZs 2, 4, and 5.
- 28 ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent  
29 removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and  
30 945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of  
31 the restored nontidal marsh would be open water, and the remainder would support emergent  
32 wetland vegetation that could provide low-value roosting habitat for tricolored blackbird  
33 depending on vegetation density and composition.
- 34 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
35 actions that are designed to enhance wildlife values in BDCP-protected habitats could result in  
36 localized ground disturbances that could temporarily remove small amounts of tricolored  
37 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
38 road and other infrastructure maintenance, would be expected to have minor effects on  
39 available tricolored blackbird habitat and are expected to result in overall improvements to and  
40 maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects  
41 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
42 the AMMs listed below. CM11 would also include the construction of recreational-related  
43 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*  
44 *and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
45 etc. would be placed on existing, disturbed areas when and where possible. However,  
46 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland

1 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts  
2 from recreation facilities that would occur within the first 10 years of Plan implementation  
3 would include a loss of 13 acres of breeding habitat.

- 4 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
5 tricolored blackbird grassland foraging habitat in CZ 1.
- 6 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
8 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent  
9 to work areas. Maintenance activities would include vegetation management, levee and  
10 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
11 would be reduced by AMMs and conservation actions as described below.
- 12 ● *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or  
13 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to  
14 land clearing activities, nest abandonment, or increased exposure to the elements or to  
15 predators. Injury to or mortality of adults and fledged juveniles would not be expected as  
16 individuals would be expected to avoid contact with construction equipment. Construction  
17 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,  
18 contouring, and other initial ground-disturbing operations that could temporarily reduce the  
19 extent and functions supported by the affected habitat. To the maximum extent practicable,  
20 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,  
21 from an active tricolored blackbird nesting colony. If monitoring determines an activity is  
22 adversely affecting a nesting colony, construction will be modified, as practicable, by either  
23 delaying construction until the colony site is abandoned or until the end of the breeding season,  
24 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access  
25 to the construction site. These measures to avoid injury or mortality of nesting tricolored  
26 blackbirds are described in *AMM21 Tricolored Blackbird* (Appendix 3.C, *Avoidance and*  
27 *Minimization Measures*).

28 The following paragraphs summarize the combined effects discussed above and describe other  
29 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
30 included.

### 31 ***Near-Term Timeframe***

32 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
33 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
34 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
35 effects of construction would not be adverse under NEPA. The Plan would remove 5,281 acres of  
36 breeding habitat (98 acres of nesting, 3,943 acres of cultivated lands, and 1,240 acres of  
37 noncultivated lands suitable for foraging) and 14,283 acres of nonbreeding habitat (621 acres of  
38 roosting, 12,826 acres of cultivated lands, and 836 acres of noncultivated lands suitable for foraging)  
39 for tricolored blackbird in the study area in the near-term. These effects would result from the  
40 construction of the water conveyance facilities (CM1, 2,593 acres of breeding, 9,453 acres of  
41 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
42 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
43 *Restoration*, and *CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres  
44 of nonbreeding).

1 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
2 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
3 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
4 protection for the loss of cultivated lands.

5 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
6 blackbird habitat from CM1 would require 10 acres of restoration and 10 acres of protection of  
7 nesting habitat, 51 acres of restoration and 51 acres of protection of roosting habitat, 1,436 acres of  
8 protection of noncultivated lands that provide foraging habitat, 2,202 acres of protection of  
9 cultivated lands suitable for foraging during the breeding season, and 9,025 acres of cultivated lands  
10 that provide foraging habitat during the nonbreeding season. The near-term effects of other  
11 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
12 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
13 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
14 nonbreeding season. Compensation for these losses from other conservation measures would  
15 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
16 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
17 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands  
18 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
19 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

20 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
21 typical ratios above would be 98 acres of restoration and 98 acres of protection for nesting habitat,  
22 621 acres of restoration and 621 acres of protection for roosting habitat, 4,152 acres of protection of  
23 noncultivated foraging habitat, 3,943 acres of protection for cultivated lands that provide foraging  
24 habitat during the breeding season, and 12,826 acres of cultivated lands that provide foraging  
25 habitat during the nonbreeding season.

26 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
27 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
28 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
29 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
30 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
31 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
32 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).  
33 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in  
34 the same timeframe as the construction and early restoration losses. Some proportion of these  
35 natural communities provide suitable habitat for tricolored blackbird as described below.

36 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
37 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
38 wetland, in close association with highly productive foraging areas that support abundant insect  
39 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
40 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs  
41 1, 2, 8, or 11 (see Table 12-1B-38 for foraging habitat values) and would be actively managed to  
42 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
43 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities  
44 Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
45 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,



1 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
2 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of  
3 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
4 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
5 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of  
6 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

7 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal  
8 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
9 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*  
10 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
11 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
12 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
13 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
14 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
15 valley/foothill riparian, 720 acres managed wetland).

16 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
17 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
18 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
19 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The  
20 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
21 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
22 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
23 reproductive success in tricolored blackbirds. These natural communities are known to support  
24 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
25 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
26 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
27 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
28 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
29 and GNC2.4).

30 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
31 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
32 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
33 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
34 term. Assuming that lands would be protected proportional to the conservation objectives for  
35 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
36 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
37 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
38 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
39 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
40 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
41 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of  
42 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
43 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
44 habitats for species including tricolored blackbird would also be protected that occur within the  
45 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,

1 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
2 tricolored blackbird (Objective CLNC1.3).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
4 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
5 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
8 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
9 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

10 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
11 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
12 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
13 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
14 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
15 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
16 by this acreage, and temporary impacts on grassland would be restored to preproject conditions  
17 (including revegetation with native vegetation if within 1 year of completion of construction) under  
18 *AMM2 Construction Best Management Practices and Monitoring. With the enhancement of grasslands*  
19 *described above, and the restoration of temporary habitat impacts, this difference between*  
20 *impacted and conserved grassland acreages in the near-term time period would not result in an*  
21 *adverse effect on tricolored blackbird.*

22 **Table 12-1B-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season <sup>a</sup> Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, millet, alfalfa and mixed alfalfa, mixed pasture, native pasture, induced high water table native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grass pasture, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Wheat, mixed grain and hay, farmsteads	Wheat, oats, mixed grain and hay, farmsteads
Marginal	Rice	None
None	All remaining crop types	All remaining crop types

<sup>a</sup> Generally March through August; occasional breeding in fall (September through November).

23

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
3 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
4 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
5 breeding habitat available, the study area does not currently support many nesting tricolored  
6 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
7 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).  
8 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 14,801  
9 acres of breeding habitat and 36,815 acres of nonbreeding habitat for tricolored blackbird during  
10 the term of the Plan (9% of the total breeding habitat in the study area and 14% of the total  
11 nonbreeding habitat in the study area). The locations of these losses are described above in the  
12 analyses of individual conservation measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
14 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
15 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
16 *Restoration*, to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
17 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
18 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
19 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
20 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

21 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or  
22 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
23 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
24 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-  
25 1B-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan  
26 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,  
27 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,  
28 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of  
29 moderate-, high-, or very high-value cultivated lands would be conserved and managed as  
30 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective  
31 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging  
32 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15  
33 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of  
34 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant  
35 throughout the study area, so the loss is not expected to adversely affect the population in the study  
36 area.

37 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
38 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
39 the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding  
40 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored  
41 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

4 **NEPA Effects:** The losses of tricolored blackbird habitat and potential for direct mortality of this  
5 special-status species under Alternative 1B would represent an adverse effect in the absence of  
6 other conservation actions. However, with habitat protection and restoration associated with CM3,  
7 CM4, CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1–  
8 AMM7, and *AMM21 Tricolored Blackbird*, which would be in place throughout the construction  
9 period, the effects of habitat loss or potential for mortality on tricolored blackbird would not be  
10 adverse under Alternative 1B.

11 **CEQA Conclusion:**

12 **Near-Term Timeframe**

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
16 effects of construction would be less than significant under CEQA. The Plan would remove 5,281  
17 acres of breeding habitat (98 acres of nesting, 3,943 acres of cultivated lands, and 1,240 acres of  
18 noncultivated lands suitable for foraging) and 14,283 acres of nonbreeding habitat (621 acres of  
19 roosting, 12,826 acres of cultivated lands, and 836 acres of noncultivated lands suitable for foraging)  
20 for tricolored blackbird in the study area in the near-term. These effects would result from the  
21 construction of the water conveyance facilities (CM1, 2,593 acres of breeding, 9,453 acres of  
22 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
23 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
24 *Restoration*, and *CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres  
25 of nonbreeding).

26 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
27 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
28 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
29 protection for the loss of cultivated lands.

30 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
31 blackbird habitat from CM1 would require 10 acres of restoration and 10 acres of protection of  
32 nesting habitat, 51 acres of restoration and 51 acres of protection of roosting habitat, 1,436 acres of  
33 protection of noncultivated lands that provide foraging habitat, 2,202 acres of protection of  
34 cultivated lands suitable for foraging during the breeding season, and 9,025 acres of cultivated lands  
35 that provide foraging habitat during the nonbreeding season. The near-term effects of other  
36 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
37 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
38 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
39 nonbreeding season. Compensation for these losses from other conservation measures would  
40 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
41 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
42 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands  
43 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
44 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

1 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
2 typical ratios above would be 98 acres of restoration and 98 acres of protection for nesting habitat,  
3 621 acres of restoration and 621 acres of protection for roosting habitat, 4,152 acres of protection of  
4 noncultivated foraging habitat, 3,943 acres of protection for cultivated lands that provide foraging  
5 habitat during the breeding season, and 12,826 acres of cultivated lands that provide foraging  
6 habitat during the nonbreeding season.

7 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
8 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
9 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
10 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
11 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
12 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
13 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).  
14 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in  
15 the same timeframe as the construction and early restoration losses. Some proportion of these  
16 natural communities provide suitable habitat for tricolored blackbird as described below.

17 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
18 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
19 wetland, in close association with highly productive foraging areas that support abundant insect  
20 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
21 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs  
22 1, 2, 8, or 11 (see Table 12-1B-38 for foraging habitat values) and would be actively managed to  
23 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
24 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*  
25 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
26 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
27 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
28 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of  
29 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
30 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
31 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of  
32 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

33 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal  
34 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
35 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*  
36 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
37 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
38 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
39 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
40 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
41 valley/foothill riparian, 720 acres managed wetland).

42 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
43 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
44 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
45 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The

1 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
2 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
3 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
4 reproductive success in tricolored blackbirds. These natural communities are known to support  
5 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
6 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
7 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
8 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
9 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
10 and GNC2.4).

11 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
12 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
13 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
14 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
15 term. Assuming that lands would be protected proportional to the conservation objectives for  
16 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
17 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
18 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
19 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
20 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
21 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
22 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of  
23 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
24 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
25 habitats for species including tricolored blackbird would also be protected that occur within the  
26 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
27 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
28 tricolored blackbird (Objective CLNC1.3).

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
34 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
35 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

36 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
37 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
38 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
39 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
40 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
41 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
42 by this acreage, and temporary impacts on grassland would be restored to preproject conditions  
43 (including revegetation with native vegetation if within 1 year of completion of construction) under  
44 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands  
45 described above, and the restoration of temporary habitat impacts, this difference between

1 impacted and conserved grassland acreages in the near-term time period would not result in a  
2 significant impact on tricolored blackbird.

3 **Late Long-Term Timeframe**

4 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
5 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
6 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
7 breeding habitat available, the study area does not currently support many nesting tricolored  
8 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
9 Bypass, and along the southwestern perimeter of the study area (BDCP, Chapter 5, *Effects Analysis*).  
10 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 14,801  
11 acres of breeding habitat and 36,815 acres of nonbreeding habitat for tricolored blackbird during  
12 the term of the Plan (9% of the total breeding habitat in the study area and 14% of the total  
13 nonbreeding habitat in the study area). The locations of these losses are described above in the  
14 analyses of individual conservation measures. The locations of these losses are described above in  
15 the analyses of individual conservation measures.

16 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
17 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
18 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*  
19 *Restoration*, to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
20 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
21 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
22 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
23 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

24 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or  
25 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
26 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
27 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-  
28 1B-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan  
29 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,  
30 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,  
31 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of  
32 moderate-, high-, or very high-value cultivated lands would be conserved and managed as  
33 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective  
34 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging  
35 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15  
36 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of  
37 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant  
38 throughout the study area, so the loss is not expected to adversely affect the population in the study  
39 area.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
41 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
42 the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres of breeding  
43 habitat and 31,090 acres of nonbreeding habitat) and restoration of 31,001 acres of tricolored  
44 blackbird habitat (2,190 acres of breeding habitat and 28,811 acres of nonbreeding habitat).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
6 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
7 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

8 Considering these protection and restoration provisions, which would provide acreages of new or  
9 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
10 and restoration activities, and with implementation of AMM1–AMM7 and *AMM21 Tricolored*  
11 *Blackbird*, the loss of habitat or direct mortality through the implementation of Alternative 1B as a  
12 whole would not result in a substantial adverse effect through habitat modifications and would not  
13 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
14 would have a less-than-significant impact on tricolored blackbird. There are three other factors  
15 relevant to effects on tricolored blackbird.

- 16 ● Very little loss of nesting habitat would occur (up to 84 acres of permanent loss and 90 acres of  
17 temporary loss).
- 18 ● Most of the loss of breeding and nonbreeding habitat would be to cultivated lands that are  
19 abundant throughout the Plan Area, so the loss is not expected to adversely affect the population  
20 in the Plan Area.
- 21 ● Most temporary impacts would be on cultivated lands and grasslands that could be restored  
22 relatively quickly to suitable foraging habitat after completion of construction activities.

23 Considering these protection and restoration provisions, which would provide acreages of new or  
24 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
25 and restoration activities, and implementation of AMM1–AMM7, and *AMM21 Tricolored Blackbird*,  
26 the loss of habitat or direct mortality through the implementation of Alternative 1B as a whole would  
27 not result in a substantial adverse effect through habitat modifications and would not substantially  
28 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-  
29 than-significant impact on tricolored blackbird.

### 30 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 31 **Facilities**

32 New transmission lines would increase the risk that tricolored blackbirds could be subject to power  
33 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would  
34 have the potential to intersect the proposed transmission lines largely due to winter movements  
35 throughout the study area, when individuals are migrating in large flocks and dense fog is common  
36 in the area). Although migratory movements may increase the risk of strike hazard, daily flights  
37 associated with winter foraging likely occurs in smaller flocks at heights that are lower than the  
38 transmission lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*  
39 *Transmission Lines*). Transmission line poles and towers provide perching substrate for raptors,  
40 which could result in increased predation pressure on local tricolored blackbirds. The existing  
41 network of transmission lines in the Plan Area currently poses these risks and any incremental risk  
42 associated with the new power line corridors would not be expected to affect the study area



1 population. *AMM20 Greater Sandhill Crane*, would further reduce any potential effects of  
2 transmission lines on tricolored blackbird.

3 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline  
4 strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane*, would  
5 reduce the potential impact of the construction of new transmission lines on tricolored blackbird  
6 and would not result in an adverse effect on the species.

7 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird  
8 powerline strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane*,  
9 would reduce the potential impact of the construction of new transmission lines on tricolored  
10 blackbird to a less-than-significant level.

### 11 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

12 **Indirect construction- and operation-related effects:** Tricolored blackbird nesting habitat within  
13 the vicinity of proposed construction areas that could be indirectly affected by construction  
14 activities. Construction noise above background noise levels (greater than 50 dBA) could extend  
15 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,  
16 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),  
17 although there are no available data to determine the extent to which these noise levels could affect  
18 tricolored blackbird. Indirect effects associated with construction include noise, dust, and visual  
19 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside  
20 the project footprint but within 1,300 feet from the construction edge. Construction and subsequent  
21 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
22 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*  
23 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be  
24 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where  
25 practicable until breeding has ceased. In addition, monitoring would be implemented to ensure that  
26 construction does not adversely affect the nesting colony. The use of mechanical equipment during  
27 water conveyance facilities construction could cause the accidental release of petroleum or other  
28 contaminants that could affect tricolored blackbird in the surrounding habitat. The inadvertent  
29 discharge of sediment or excessive dust adjacent to tricolored blackbird habitat could also affect the  
30 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,  
31 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
32 from the construction area and negative effects of dust on active nests.

33 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
34 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain  
35 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
36 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
37 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
38 restoration activities that create newly inundated areas could increase bioavailability of mercury  
39 (see BDCP Chapter 3 *Conservation Strategy*, for details of restoration).

40 The potential mobilization or creation of methylmercury within the study area varies with site-  
41 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
42 *Management* contains provisions for project-specific Mercury Management Plans. Breeding  
43 tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure because  
44 tidal wetlands are not expected to be a major foraging area for the species. Furthermore, the Suisun

1 Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored under the  
2 plan would generate less methylmercury than the existing managed wetlands, potentially reducing  
3 the overall risk. However, species sensitivity to methylmercury differs widely and there is a large  
4 amount of uncertainty with respect to species-specific effects and increased methylmercury  
5 associated with natural community and floodplain restoration could indirectly affect tricolored  
6 blackbird, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).  
7 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
8 monitoring and adaptive management as described in CM12 would be available to address the  
9 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on tricolored  
10 blackbird.

11 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
12 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
13 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
14 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
15 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
16 classes within a species. In addition, the effect of selenium on a species can be confounded by  
17 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
18 2009).

19 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
20 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
21 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
22 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
23 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
24 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
25 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
26 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
27 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
28 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
29 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
30 levels of selenium have a higher risk of selenium toxicity.

31 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
32 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
33 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh  
34 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
35 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
36 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
37 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
38 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
39 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
40 long-term increases in selenium concentrations in water in the Delta under any alternative.  
41 However, it is difficult to determine whether the effects of potential increases in selenium  
42 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to  
43 adverse effects on tricolored blackbird.

44 Because of the uncertainty that exists at this programmatic level of review, there could be a  
45 substantial effect on tricolored blackbird from increases in selenium associated with restoration

1 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
2 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
3 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
4 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
5 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
6 separately for each restoration effort as part of design and implementation. This avoidance and  
7 minimization measure would be implemented as part of the tidal habitat restoration design  
8 schedule.

9 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and  
10 sedimentation, and operations and maintenance of the water conveyance facilities would not be  
11 adverse with the implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*. Tidal habitat  
12 restoration could result in increased exposure of California least tern to selenium. This effect would  
13 be addressed through the implementation of *AMM27 Selenium Management* which would provide  
14 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
15 selenium and its bioavailability in tidal habitats. The implementation of tidal natural communities  
16 restoration or floodplain restoration could result in increased exposure of tricolored blackbird to  
17 methylmercury. It is unlikely that breeding tricolored blackbird would be highly susceptible to  
18 methylmercury exposure because tidal wetlands are not expected to be a major foraging area for the  
19 species. However, it is unknown what concentrations of methylmercury are harmful to this species  
20 and the potential for increased exposure varies substantially within the study area. Site-specific  
21 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
22 adaptive management as described in *CM12 Methylmercury Management*, would better inform the  
23 potential effects of methylmercury on tricolored blackbird. The site-specific planning phase of  
24 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury  
25 exposure for tricolored blackbird, once site specific sampling and other information could be  
26 developed.

27 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
28 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
29 than significant with the implementation of *AMM21 Tricolored Blackbird* and AMM1–AMM7. Tidal  
30 habitat restoration could result in increased exposure of California least tern to selenium. This  
31 impact would be addressed through the implementation of *AMM27 Selenium Management* which  
32 would provide specific tidal habitat restoration design elements to reduce the potential for  
33 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal  
34 natural communities restoration or floodplain restoration could result in increased exposure of  
35 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be  
36 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major  
37 foraging area for the species. However, it is unknown what concentrations of methylmercury are  
38 harmful to this species. Site-specific restoration plans that address the creation and mobilization of  
39 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*  
40 *Management*, would better inform the potential impacts of methylmercury on tricolored blackbird.  
41 With these measures in place, indirect effects from Alternative 1B would have a less-than-significant  
42 impact on tricolored blackbird.

1 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of**  
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass (CM2) would inundate 2,447–4,312 acres of breeding habitat and 263–  
4 1,252 acres of nonbreeding habitat (Table 12-1B-37). Based on hypothetical floodplain restoration,  
5 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
6 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124  
7 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of  
8 nonbreeding habitat (29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated  
9 lands suitable for foraging, Table 12-1B-37) resulting in the temporary loss of these habitats.  
10 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to  
11 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current  
12 flooding regime. However, this inundation could reduce the availability of nesting habitat during  
13 years when flooding extends into the nesting season (past March). The periodic inundation of the  
14 Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood  
15 regime in support of wetland and riparian vegetation types that support nesting habitat. There  
16 would be no expected adverse effect on tricolored blackbird.

17 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
18 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect  
19 on tricolored blackbird because inundation is expected to take place outside of the breeding season.  
20 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
21 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

22 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
23 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant  
24 impact on tricolored blackbird because inundation is expected to take place outside of the breeding  
25 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
26 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

27 **Western Burrowing Owl**

28 This section describes the effects of Alternative 1B, including water conveyance facilities  
29 construction and implementation of other conservation components, on western burrowing owl.  
30 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and  
31 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural  
32 communities and pasture. Low-value habitat includes plant alliances and crop types from managed  
33 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported  
34 species use patterns from the literature.

35 Construction and restoration associated with Alternative 1B conservation measures would result in  
36 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in  
37 Table 12-1B-39. Full implementation of Alternative 1B would also include the following  
38 conservation actions over the term of the BDCP to benefit the western burrowing owl (BDCP  
39 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 40 • Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value  
41 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-  
42 value habitat (Objective WBO1.1, associated with CM3).

- 1 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
- 2 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
- 3 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 4 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 5 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
- 6 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 7 • Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to
- 8 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9)
- 9 • Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3,
- 10 ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11)
- 11 • Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and
- 12 other native wildlife species and maintain and protect the small patches of important wildlife
- 13 habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with
- 14 CM3)

15 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
 16 management activities that would enhance habitat for the species and implementation of AMM1–  
 17 AMM7 and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be  
 18 adverse for NEPA purposes and would be less than significant for CEQA purposes.

19 **Table 12-1B-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative**  
 20 **1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	697	697	714	714	NA	NA
	Low-value	2,788	2,788	6,315	6,315	NA	NA
<b>Total Impacts CM1</b>		<b>3,485</b>	<b>3,485</b>	<b>7,029</b>	<b>7,029</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	High-value	4,487	11,570	245	328	1,390–3,303	779
	Low-value	3,527	28,506	144	971	1,522–2,927	6,162
<b>Total Impacts CM2–CM18</b>		<b>8,014</b>	<b>40,076</b>	<b>389</b>	<b>1,299</b>	<b>2,912–6,230</b>	<b>6,941</b>
<b>Total High-value</b>		<b>5,184</b>	<b>12,267</b>	<b>959</b>	<b>1,042</b>	1,390–3,303	779
<b>Total Low-value</b>		<b>6,315</b>	<b>31,294</b>	<b>6,459</b>	<b>7,286</b>	1,522–2,927	6,162
<b>TOTAL IMPACTS</b>		<b>11,499</b>	<b>43,561</b>	<b>7,418</b>	<b>8,328</b>	<b>2,912–6,230</b>	<b>6,941</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing**  
2 **Owl**

3 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
4 of up to 51,881 acres of modeled habitat for western burrowing owl (of which 13,309 acres is of  
5 high value and 38,580 acres is of low value, Table 12-1B-39). Conservation measures that would  
6 result in these losses are conveyance facilities and transmission line construction, and establishment  
7 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
8 restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), grassland  
9 restoration (CM8), marsh restoration (CM10), and conservation hatcheries (CM18). The majority of  
10 habitat loss would result from CM4. Habitat enhancement and management activities (CM11), which  
11 would include ground disturbance or removal of nonnative vegetation, could result in local adverse  
12 habitat effects. In addition, maintenance activities associated with the long-term operation of the  
13 water conveyance facilities and other BDCP physical facilities could degrade or eliminate western  
14 burrowing owl habitat. Each of these individual activities is described below. A summary statement  
15 of the combined impacts, NEPA effects and a CEQA conclusion follow the individual conservation  
16 measure discussions.

- 17 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would  
18 result in the combined permanent and temporary loss of up to 1,411 acres of modeled  
19 high-value western burrowing owl habitat (697 acres of permanent loss, 714 acres of temporary  
20 loss) from CZs 3–6 and CZ 8. In addition, 9,103 acres of low-value burrowing owl habitat would  
21 be removed (2,788 acres of permanent loss, 6,315 acres of temporary loss) from CZs 3–6 and CZ  
22 8. Losses of high and low-value habitat would occur primarily from the construction of intakes  
23 1-5, the construction of the canal and associated borrow and spoil areas, and the construction of  
24 the new forebay in CZ 8. The footprint for CM1 does not overlap with any occurrences of  
25 western burrowing owl. However, there is a high concentration of CNDDDB and DHCCP survey  
26 records for western burrowing owls in CZ 8 to the west and the south of the Clifton Court  
27 Forebay. The loss of high-value habitat from facility construction and the establishment of the  
28 forebay borrow and spoils area could remove occupied habitat, displace nesting and wintering  
29 owls, and fragment occupied burrowing owl habitat. The implementation of *AMM23 Western*  
30 *Burrowing Owl* would minimize potential effects on western burrowing owl if they were present  
31 in the construction area. Refer to the Terrestrial Biology Map Book for a detailed view of  
32 Alternative 1B construction locations. Impacts from CM1 would occur within the first 10 years  
33 of Alternative 1B implementation.
- 34 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
35 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value  
36 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in  
37 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres  
38 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10  
39 years of Alternative 1B implementation.
- 40 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
41 inundation would permanently remove an estimated 29,668 acres of modeled western  
42 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted  
43 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value  
44 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact  
45 and fragment remaining high-value grassland habitat just north of Rio Vista in and around  
46 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal

1 natural community restoration efforts would impact one extant record of burrowing owl just  
2 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.

- 3 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
4 seasonally inundated floodplain would permanently and temporarily remove approximately  
5 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of  
6 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be  
7 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San  
8 Joaquin, Old, and Middle Rivers in CZ 7.
- 9 ● *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located  
10 along levees where western burrowing owl could be present. The species is known to use often  
11 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*  
12 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities  
13 to disturb owls or affect active nests.
- 14 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
15 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In  
16 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and  
17 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.
- 18 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be  
19 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362  
20 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The  
21 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily  
22 remove available habitat but would ultimately have a beneficial effect on the western burrowing  
23 owl.
- 24 ● *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of  
25 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.
- 26 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
27 actions that are designed to enhance wildlife values in restored or protected habitats could  
28 result in localized ground disturbances that could temporarily remove small amounts of  
29 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more  
30 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,  
31 such as removal of nonnative vegetation and road and other infrastructure maintenance  
32 activities, would be expected to have minor adverse effects on available western burrowing owl  
33 habitat and would be expected to result in overall improvements to and maintenance of habitat  
34 values over the term of the BDCP. CM11 would also include the construction of recreational-  
35 related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*  
36 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging  
37 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and  
38 where possible. However, approximately 50 acres of grassland habitat would be lost from the  
39 construction of trails and facilities.

40 Habitat management- and enhancement-related activities and equipment operation could  
41 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,  
42 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest  
43 failure and mortality or other adverse effects on western burrowing owl would be avoided or  
44 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would

1 require surveys to determine presence or absence and the establishment of no-disturbance  
2 buffers around active sites.

- 3 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
4 value western burrowing owl habitat for the development of a delta and longfin smelt  
5 conservation hatchery in CZ 1.
- 6 • **Operations and Maintenance**: Postconstruction operation and maintenance of the above-ground  
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
8 disturbances that could affect western burrowing owl use of the surrounding habitat.  
9 Maintenance activities would include vegetation management, levee and structure repair, and  
10 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
11 AMMs and conservation actions as described below.
- 12 • **Injury and Direct Mortality**: Construction would not be expected to result in direct mortality of  
13 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction  
14 activities, equipment operation could destroy nests and noise and visual disturbances could lead  
15 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys  
16 detected any occupied burrows and no-disturbance buffers would be implemented.

17 The following paragraphs summarize the combined effects discussed above and describe other  
18 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
19 included.

#### 20 ***Near-Term Timeframe***

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
23 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
24 effects of construction would not be adverse under NEPA. The Plan would remove 6,143 acres  
25 (5,184 acres permanent, 959 acres temporary) of high-value habitat for western burrowing owl in  
26 the study area in the near-term. These effects would result from the construction of the water  
27 conveyance facilities (CM1, 1,411 acres), and implementing other conservation measures (*CM2 Yolo*  
28 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
29 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
30 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
31 *and CM18 Conservation Hatcheries*—4,732 acres). In addition, 12,774 acres of low-value habitat  
32 would be removed or converted in the near-term (CM1, 9,103 acres; *CM2 Yolo Bypass Fisheries*  
33 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*  
34 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*  
35 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*  
36 *Conservation Hatcheries*—3,671 acres).

37 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
38 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the  
39 loss of low-value habitat would result from conversion and enhancement to high-value habitats.  
40 Using these typical ratios would indicate that 2,822 acres should be protected to compensate for the  
41 loss of high-value habitat from CM1 and that 9,103 acres should be protected to compensate for the  
42 loss of low-value habitat from CM1. The near-term effects of other conservation actions would  
43 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of  
44 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA



1 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value  
2 habitat).

3 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
4 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
5 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
6 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
7 in the same timeframe as the construction and early restoration losses.

8 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
9 owl populations in the plan area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
10 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
11 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
12 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
13 pool natural communities which would provide habitat for western burrowing owl and reduce the  
14 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
15 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl  
16 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
17 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
18 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
19 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
20 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
21 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
22 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
23 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
24 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
25 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
26 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
27 standards for considering the effectiveness of conservation actions.

28 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
29 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
30 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
31 CM1 and other near-term effects on western burrowing owl high-value habitat with the  
32 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term  
33 timeframe would be managed in suitable crop types to compensate for the loss of high-value  
34 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate for Near-Term Loss*  
35 *of High-Value Western Burrowing Owl Habitat*, would be available to address the adverse effect of  
36 high-value habitat loss in the near-term.

37 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts  
38 would be 6,000 acres less than the typical ratio of 1:1 protection. However, 6,459 acres of all near-  
39 term impacts on low-value habitat would be temporary and would be restored within 1 year of the  
40 completion of construction. In addition, a proportion of the loss of low-value habitat would be a  
41 result of the conversion to high-value habitat and the near-term conservation acres would be  
42 sufficient to compensate for the permanent impacts on low-value habitat for the species. The  
43 management and enhancement of cultivated lands and protected grasslands including prey  
44 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value

1 habitat, would further compensate for any potential effect from the near-term loss of low-value  
2 foraging habitat on western-burrowing owl.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 10 **Late Long-Term Timeframe**

11 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and  
12 254,352 acres of low-value habitat for western burrowing owl. Alternative 1B as a whole would  
13 result in the permanent loss of and temporary effects on 13,309 acres of high-value habitat and  
14 38,580 acres of low value habitat over the term of the Plan. The locations of these losses are  
15 described above in the analyses of individual conservation measures.

16 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
17 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
18 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
19 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
20 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
21 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
22 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
23 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
24 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
25 pool natural communities which would provide habitat for western burrowing owl and reduce the  
26 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
27 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl  
28 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
29 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
30 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
31 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
32 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated  
33 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives  
34 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres  
35 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within  
36 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under  
37 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
38 populations would be increased on protected lands, enhancing the foraging value of these natural  
39 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would  
40 be increased on protected natural communities by encouraging ground squirrel occupancy and  
41 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
42 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
44 *Plant Species*) estimates that the restoration and protection actions discussed above could result in

1 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
2 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
3 habitat (1,642 acres high-value and 3 acres low-value habitat).

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6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
9 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
10 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

11 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-  
12 status species under Alternative 1B would represent an adverse effect in the absence of other  
13 conservation actions. However, with habitat protection and restoration associated with CM3, CM8,  
14 and CM11, guided by biological goals and objectives and by AMM1–AMM7, *AMM23 Western*  
15 *Burrowing Owl*, and with implementation of Mitigation Measure BIO-91, *Compensate for Near-Term*  
16 *Loss of High-Value Western Burrowing Owl Habitat*, which would be available to guide the near-term  
17 protection and management of cultivated lands, the effects of habitat loss and potential mortality on  
18 western burrowing owl would not be adverse under Alternative 1B.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
23 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
24 effects of construction would be less than significant under CEQA. The Plan would remove 6,143  
25 acres (5,184 acres permanent, 959 acres temporary) of high-value habitat for western burrowing  
26 owl in the study area in the near-term. These effects would result from the construction of the water  
27 conveyance facilities (CM1, 1,411 acres), and implementing other conservation measures (*CM2 Yolo*  
28 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
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31 and *CM18 Conservation Hatcheries*—4,732 acres). In addition, 12,774 acres of low-value habitat  
32 would be removed or converted in the near-term (CM1, 9,103 acres; *CM2 Yolo Bypass Fisheries*  
33 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*  
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35 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*  
36 *Conservation Hatcheries*—3,671 acres).

37 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
38 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the  
39 loss of low-value habitat would result from conversion and enhancement to high-value habitats.  
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41 loss of high-value habitat from CM1 and that 9,103 acres should be protected to compensate for the  
42 loss of low-value habitat from CM1. The near-term effects of other conservation actions would  
43 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of  
44 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA

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7 in the same timeframe as the construction and early restoration losses.

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9 owl populations in the plan area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
10 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
11 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
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14 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
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16 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
17 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
18 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
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25 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
26 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
27 standards for considering the effectiveness of conservation actions.

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29 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
30 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
31 CM1 and other near-term effects on western burrowing owl high-value habitat with the  
32 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term  
33 timeframe would be managed in suitable crop types to compensate for the loss of high-value  
34 burrowing owl habitat at a ratio of 2:1. Implementation of Mitigation Measure BIO-91, *Compensate*  
35 *for Near-Term Loss of High-Value Western Burrowing Owl Habitat*, would reduce the impact of high-  
36 value habitat loss in the near-term.

37 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts  
38 would be 6,000 acres less than the typical ratio of 1:1 protection. However, 6,459 acres of all near-  
39 term impacts on low-value habitat would be temporary and would be restored within 1 year of the  
40 completion of construction. In addition, a proportion of the loss of low-value habitat would be a  
41 result of the conversion to high-value habitat and the near-term conservation acres would be  
42 sufficient to compensate for the permanent impacts on low-value habitat for the species. The  
43 management and enhancement of cultivated lands and protected grasslands including prey  
44 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value

1 habitat, would further compensate for any potential effect from the near-term loss of low-value  
2 foraging habitat on western-burrowing owl.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 10 **Late Long-Term Timeframe**

11 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and  
12 254,352 acres of low-value habitat for western burrowing owl. Alternative 1B as a whole would  
13 result in the permanent loss of and temporary effects on 13,309 acres of high-value habitat and  
14 38,580 acres of low value habitat over the term of the Plan. The locations of these losses are  
15 described above in the analyses of individual conservation measures.

16 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
17 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
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19 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
20 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
21 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
22 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
23 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
24 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
25 pool natural communities which would provide habitat for western burrowing owl and reduce the  
26 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
27 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl  
28 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
29 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
30 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
31 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
32 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated  
33 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives  
34 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres  
35 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within  
36 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under  
37 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
38 populations would be increased on protected lands, enhancing the foraging value of these natural  
39 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would  
40 be increased on protected natural communities by encouraging ground squirrel occupancy and  
41 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
42 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
44 *Plant Species*) estimates that the restoration and protection actions discussed above could result in

1 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
2 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
3 habitat (1,642 acres high-value and 3 acres low-value habitat).

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
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7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
9 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
10 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

11 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
12 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
13 construction and restoration activities, and with implementation of AMM1–AMM7, *AMM23 Western*  
14 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*  
15 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and  
16 management of cultivated lands, the loss of habitat or direct mortality through implementation of  
17 Alternative 1B would not result in a substantial adverse effect through habitat modifications and  
18 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of  
19 habitat or potential mortality under this alternative would have a less-than-significant impact on  
20 western burrowing owl.

#### 21 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western** 22 **Burrowing Owl Habitat**

23 Because the BDCP lacks acreage commitment for crop types that would be protected and  
24 managed within the 15,400 acres of cultivated lands protected in the near-term time period,  
25 DWR will compensate for the loss of high-value burrowing owl habitat with high-value natural  
26 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

#### 27 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission** 28 **Facilities**

29 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
30 which could result in injury or mortality of western burrowing owl. The species is large-bodied but  
31 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls  
32 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,  
33 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk  
34 species for powerline collision. While the species is not widespread in the study area, it may become  
35 more widely distributed as grassland enhancement improves habitat for the species. Even so, the  
36 risk of effects on the population are low, given the species' physical and behavioral characteristics  
37 (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).  
38 New transmission lines would not be expected to have an adverse effect on the species.

39 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
40 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal  
41 based on the owl's physical and behavioral characteristics.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
2 significant impact on western burrowing owl because the risk of bird strike is considered to be  
3 minimal based on the owl's physical and behavioral characteristics.

#### 4 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

5 Noise and visual disturbances associated with construction-related activities could result in  
6 temporary disturbances that affect western burrowing owl use of modeled habitat adjacent to  
7 proposed construction areas. Indirect effects associated with construction include noise, dust, and  
8 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.  
9 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season  
10 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January  
11 31) could potential displace winter owls or cause abandonment of active nests. These potential  
12 effects would be minimized with the implementation of *AMM23 Western Burrowing Owl* into the  
13 BDCP, which would require preconstruction surveys and establish no-disturbance buffers around  
14 active burrows. Construction noise above background noise levels (greater than 50 dBA) could  
15 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment  
16 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),  
17 although there are no available data to determine the extent to which these noise levels could affect  
18 western burrowing owl.

19 The use of mechanical equipment during water conveyance facilities construction could cause the  
20 accidental release of petroleum or other contaminants that could affect western burrowing owl in  
21 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
22 western burrowing owl habitat could also affect the species. *AMM1–AMM7* in addition to *AMM23*  
23 *Western Burrowing Owl* would minimize the likelihood of such spills from occurring and ensure that  
24 measures were in place to prevent runoff from the construction area and any adverse effects of dust  
25 on active nests.

26 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 1B  
27 implementation could have adverse effects on this species through the modification of habitat and  
28 potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential to  
29 disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton Court  
30 Forebay and adjacent to work area. With the implementation of *AMM1–AMM7*, and *AMM23 Western*  
31 *Burrowing Owl*, the indirect effects from Alternative 1B implementation would not be adverse under  
32 NEPA.

33 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 1B  
34 implementation could have significant impacts on these species through the modification of habitat  
35 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential  
36 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton  
37 Court Forebay and adjacent to work areas. With the implementation of *AMM1–AMM7* and *AMM23*  
38 *Western Burrowing Owl*, the indirect effects resulting from Alternative 1B implementation would  
39 have a less-than-significant impact on western burrowing owl.

1 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result**  
2 **of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,195–  
5 3,004 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-1B-39).

6 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
7 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled  
8 habitat (6,162 acres of which would be low-value foraging habitat; Table 12-1B-39).

9 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation  
10 frequency and duration of cultivated lands and grassland habitats may affect prey populations that  
11 have insufficient time to recover following inundation events. Depending on timing, seasonal  
12 inundation of western burrowing owl habitat could result in displacement from nesting burrows or  
13 drowning of individuals. The potential for this effect is considered low because suitable burrow sites  
14 would most likely be located along setback levees, which are expected to be subject to inundation  
15 less frequently than floodplain surfaces that would be less likely to support suitable nesting  
16 burrows. The periodically inundated habitat would not be expected to have an adverse effect on the  
17 population.

18 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on  
19 the population. The potential for direct mortality of western burrowing owl caused by inundation  
20 would be low because the locations of burrows would likely be above elevations consistently subject  
21 to inundation; therefore, the potential impact would not be adverse.

22 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation  
23 would be low because the locations of burrows would likely be above elevations consistently subject  
24 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant  
25 impact on the population.

26 **Western Yellow-Billed Cuckoo**

27 This section describes the effects of Alternative 1B, including water conveyance facilities  
28 construction and implementation of other conservation components, on western yellow-billed  
29 cuckoo. The habitat model for western yellow-billed cuckoo includes potential breeding habitat,  
30 which includes plant alliances from the valley/foothill riparian modeled habitat that contain a dense  
31 forest canopy for foraging with understory willow for nesting, and a minimum patch size of 50 acres.  
32 Modeled habitat also includes migratory habitat, which contains the same plant alliances as  
33 breeding habitat but without the minimum 50-acre patch size requirement.

34 The western yellow-billed cuckoo is uncommon in the Plan Area at present, and the likelihood that it  
35 will be found using the modeled habitat is low relative to more abundant riparian species. Nesting of  
36 the species in the plan area has not been confirmed for approximately 100 years. Western yellow-  
37 billed cuckoo was detected in the study area during 2009 DHCCP surveys, but nesting was not  
38 confirmed and the bird is suspected to have been a migrant (Appendix 12C, *2009 to 2011 Bay Delta*  
39 *Conservation Plan EIR/EIS Environmental Data Report*). Construction and restoration associated  
40 with Alternative 1B conservation measures would result in both temporary and permanent losses of  
41 Western yellow-billed cuckoo modeled habitat as indicated in Table 12-1B-40. Full implementation  
42 of Alternative 1B would also include the following conservation actions over the term of the BDCP to



benefit the western yellow-billed cuckoo (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with CM7).
- Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10 (Objective VFRNC1.2, associated with CM3).
- Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3, associated with CM3 and CM7).
- Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and CM7).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance these natural communities for the species and implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on Western yellow-billed cuckoo would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1B-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	3	3	0	0	NA	NA
	Migratory	15	15	26	26	NA	NA
<b>Total Impacts CM1</b>		<b>18</b>	<b>18</b>	<b>26</b>	<b>26</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Breeding	29	142	5	10	11–20	17
	Migratory	278	383	83	94	37–64	125
<b>Total Impacts CM2–CM18</b>		<b>307</b>	<b>525</b>	<b>88</b>	<b>104</b>	<b>48–84</b>	<b>142</b>
<b>Total Breeding</b>		<b>32</b>	<b>145</b>	<b>5</b>	<b>10</b>	11–20	17
<b>Total Migratory</b>		<b>293</b>	<b>398</b>	<b>109</b>	<b>120</b>	37–64	125
<b>TOTAL IMPACTS</b>		<b>325</b>	<b>543</b>	<b>114</b>	<b>130</b>	<b>48–84</b>	<b>142</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**  
2 **Billed Cuckoo**

3 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
4 of up to 673 acres of modeled habitat for western yellow-billed cuckoo (155 acres of breeding  
5 habitat, 518 acres of migratory habitat; Table 12-1B-40). Conservation measures that would result  
6 in these losses are conveyance facilities and transmission line construction, and establishment and  
7 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat  
8 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
9 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,  
10 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
11 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
12 degrade or eliminate western yellow-billed cuckoo modeled habitat. Each of these individual  
13 activities is described below. A summary statement of the combined impacts and NEPA effects and a  
14 CEQA conclusion follow the individual conservation measure discussions

- 15 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B water conveyance facilities  
16 would result in the permanent loss of up to 3 acres of modeled western yellow-billed cuckoo  
17 breeding habitat and the combined permanent and temporary loss of 41 acres of modeled  
18 migratory habitat (15 acres of permanent loss, 41 acres of temporary loss; Table 12-1B-40). The  
19 habitat would be removed at multiple locations from the north Delta to the east Delta and in the  
20 vicinity of Clifton Court Forebay. Habitat loss would primarily occur as a result of the  
21 construction of Intakes 1-5, the construction of the canal, and temporary work areas. There are  
22 no stand occurrences of yellow-billed cuckoo nests in the study area. However, this loss would  
23 have the potential to displace individuals, if present, and remove the functions and value of  
24 modeled habitat for nesting, protection, or foraging. Refer to the Terrestrial Biology Map Book  
25 for a detailed view of Alternative 1B construction locations.
- 26 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
27 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent  
28 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent  
29 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss  
30 is expected to occur during the first 10 years of Alternative 1B implementation. There are no  
31 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 32 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
33 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo  
34 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no  
35 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed  
36 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay  
37 Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road  
38 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for  
39 CM4.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore  
41 seasonally inundated floodplain would permanently and temporarily remove approximately 11  
42 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres  
43 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of  
44 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately  
45 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally

1 inundated floodplain restoration actions. The actual number of acres that would be restored  
2 may differ from these estimates, depending on how closely the outcome of seasonally inundated  
3 floodplain restoration approximates the assumed outcome. Once this restored riparian  
4 vegetation has developed habitat functions, a portion of it would be suitable to support western  
5 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for  
6 the cuckoo.

- 7 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
8 activities that could be implemented in protected western yellow-billed cuckoo habitats would  
9 maintain and improve the functions of the habitat over the term of the BDCP. With conditions  
10 favorable for its future establishment in the Plan Area, western yellow-billed cuckoo would be  
11 expected to benefit from the increase in protected habitat. However, habitat management- and  
12 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were  
13 present near work sites. *CM11 Natural Communities Enhancement and Management* actions  
14 designed to enhance wildlife values in restored riparian habitats may result in localized ground  
15 disturbances that could temporarily remove small amounts of western yellow-billed cuckoo  
16 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and  
17 other infrastructure maintenance activities, would be expected to have minor adverse effects on  
18 available western yellow-billed cuckoo habitat and would be expected to result in overall  
19 improvements and maintenance of western yellow-billed cuckoo habitat values over the term of  
20 the BDCP.
- 21 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
22 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
23 Temporarily affected areas would be restored as riparian habitat within 1 year following  
24 completion of construction activities. Although the effects are considered temporary, the  
25 restored riparian habitat would require 5 years to several decades, for ecological succession to  
26 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
27 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
28 therefore, the replaced riparian vegetation would be expected to have structural components  
29 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
30 restoration activities are complete.
- 31 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
32 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
33 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.  
34 Maintenance activities would include vegetation management, levee and structure repair, and  
35 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
36 AMMs and conservation actions as described below.
- 37 ● Injury and Direct Mortality: Western yellow-billed cuckoo nesting has not been confirmed in the  
38 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in  
39 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
40 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding  
41 in the study area, or may nest there in the future. Construction-related activities would not be  
42 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they  
43 were present in the Plan Area, because they would be expected to avoid contact with  
44 construction and other equipment. If western yellow-billed cuckoo were to nest in the  
45 construction area, construction-related activities, including equipment operation, noise and  
46 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of

1 eggs and nestlings. These effects would be avoided and minimized with the incorporation of  
2 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*  
3 *Cuckoo* into the BDCP.

4 The following paragraphs summarize the combined effects discussed above and describe other  
5 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
6 included.

### 7 ***Near-Term Timeframe***

8 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
9 term BDCP conservation strategy has been evaluated to determine whether it would provide  
10 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
11 effects of construction would not be adverse under NEPA. The Plan would remove 439 acres of  
12 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would  
13 result from the construction of the water conveyance facilities (CM1, 44 acres [3 acres of breeding  
14 habitat; 41 acres of migratory habitat]), and implementing other conservation measures (CM2 *Yolo*  
15 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally*  
16 *Inundated Floodplain Restoration*—395 acres of modeled nesting and migratory habitat). These  
17 habitat losses would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not  
18 provide high-value habitat for the species.

19 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
20 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
21 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
22 habitat. Using these ratios would indicate that 44 acres of valley/foothill riparian habitat should be  
23 restored/created and 44 acres should be protected to compensate for the CM1 losses of yellow-  
24 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
25 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
26 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
27 protection).

28 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
29 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
30 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
31 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
32 yellow-billed cuckoo. The majority of the riparian restoration acres would occur in CZ 7 as part of a  
33 reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
34 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals  
35 and objectives in the Plan for riparian restoration also include the restoration, maintenance and  
36 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among  
37 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and  
38 grasslands (Objective VFRNC2.1). These natural community biological goals and objectives would  
39 inform the near-term protection and restoration efforts and represent performance standards for  
40 considering the effectiveness of conservation actions for the species.

41 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
42 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
43 restored riparian habitat would require several years (early-mid successional) and several decades  
44 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to

1 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
2 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP  
3 actions would not be expected to have an adverse population-level effect on the species. Overall,  
4 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
5 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
6 area.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
12 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
13 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
14 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
15 *Measures.*

### 16 ***Late Long-Term Timeframe***

17 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
18 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1B as a whole would result in  
19 the permanent loss of and temporary effects on 673 acres of modeled habitat (5% of the modeled  
20 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
21 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
22 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses  
23 would be in fragmented riparian habitat throughout the study area.

24 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
25 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
26 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
27 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
28 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
29 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
30 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
31 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
32 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
33 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
34 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
35 entirety the vegetative structure needed to support these species, because patch sizes may not be  
36 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
37 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
38 would expand the patches of existing riparian forest in order to support the species should they  
39 become established breeders in the study area.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
41 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
42 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
4 *Least Bell's Vireo, Western Yellow-Billed Cuckoo. All of these AMMs include elements that would*  
5 *avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and*  
6 *storage sites. The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization*  
7 *Measures.*

8 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 1B would  
9 represent an adverse effect in the absence of other conservation actions. However, the species is not  
10 an established breeder in the plan area and current presence is limited to migrants. In addition, the  
11 habitat that would be lost consists of small, fragmented riparian stands that do not provide high-  
12 value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and  
13 CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM22 Suisun Song*  
14 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in  
15 place throughout the construction period, the effects of habitat loss and potential mortality on  
16 western yellow-billed cuckoo would not be adverse under Alternative 1B.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
20 term BDCP conservation strategy has been evaluated to determine whether it would provide  
21 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
22 effects of construction would be less than significant under CEQA. The Plan would remove 439 acres  
23 of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would  
24 result from the construction of the water conveyance facilities (CM1, 44 acres [3 acres of breeding  
25 habitat; 41 acres of migratory habitat]), and implementing other conservation measures (*CM2 Yolo*  
26 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally*  
27 *Inundated Floodplain Restoration*—395 acres of modeled nesting and migratory habitat). These  
28 habitat losses would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not  
29 provide high-value habitat for the species.

30 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
31 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
32 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
33 habitat. Using these ratios would indicate that 44 acres of valley/foothill riparian habitat should be  
34 restored/created and 44 acres should be protected to compensate for the CM1 losses of yellow-  
35 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
36 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
37 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
38 protection).

39 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
40 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
41 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
42 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
43 yellow-billed cuckoo. The majority of the riparian restoration acres would occur in CZ 7 as part of a  
44 reserve system with extensive wide bands or large patches of valley/foothill riparian natural

1 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals  
2 and objectives in the Plan for riparian restoration also include the restoration, maintenance and  
3 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among  
4 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and  
5 grasslands (Objective VFRNC2.1). These natural community biological goals and objectives would  
6 inform the near-term protection and restoration efforts and represent performance standards for  
7 considering the effectiveness of conservation actions for the species.

8 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
9 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
10 restored riparian habitat would require several years (early-mid successional) and several decades  
11 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to  
12 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
13 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP  
14 actions would not be expected to have an adverse population-level effect on the species. Overall,  
15 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
16 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
17 area.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
23 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
24 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
25 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
26 *Measures*.

### 27 ***Late Long-Term Timeframe***

28 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
29 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1B as a whole would result in  
30 the permanent loss of and temporary effects on 673 acres of modeled habitat (5% of the modeled  
31 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
32 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
33 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
34 would be in fragmented riparian habitat throughout the study area.

35 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
36 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
37 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
38 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
39 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
40 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
41 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
42 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
43 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
44 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.

1 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
2 entirety the vegetative structure needed to support these species, because patch sizes may not be  
3 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
4 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
5 would expand the patches of existing riparian forest in order to support the species should they  
6 become established breeders in the study area.

7 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
8 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
9 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
11 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
12 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
15 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
16 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
17 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
18 *Measures.*

19 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
20 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
21 restoring habitats lost to construction and restoration activities, and with implementation of  
22 *AMM1-AMM7 and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
23 *Yellow-Billed Cuckoo,* the loss of habitat or direct mortality through implementation of Alternative  
24 1B would not result in a substantial adverse effect through habitat modifications and would not  
25 substantially reduce the number or restrict the range of the species. Therefore, the loss of habitat or  
26 potential mortality under this alternative would have a less-than-significant impact on western  
27 yellow-billed cuckoo.

### 28 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 29 **Constructing the Water Conveyance Facilities**

30 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance  
31 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.  
32 This could temporarily reduce the extent and functions supported by the affected habitat. Because  
33 western yellow-billed cuckoo is not currently present in the study area, and because the  
34 implementation of *CM5 Seasonally Inundated Floodplain Restoration* would protect and create  
35 contiguous high-value riparian habitat, any such habitat fragmentation is expected to have no or  
36 minimal effect on the species.

37 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed  
38 cuckoo. The habitat functions in the study area for the species would be greatly improved through  
39 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
40 habitat.

41 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western  
42 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly



1 improved through the implementation of CM5, which would restore and protect large contiguous  
2 patches of riparian habitat.

3 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical**  
4 **Transmission Facilities**

5 New transmission lines would increase the risk for bird-power line strikes, which could result in  
6 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses  
7 riparian forests to meet all of its breeding and wintering life requisites, the species remains  
8 primarily within the canopy of riparian forests and rarely ventures into open spaces except during  
9 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer  
10 resident, the species occurs in the study area during periods of relatively high visibility and clear  
11 weather conditions, thus further reducing collision risk from daily use patterns or seasonal  
12 migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by low wing  
13 loading and a moderate aspect ratio, making the species moderately maneuverable and presumably  
14 able to avoid collisions, especially during high-visibility conditions (BDCP Appendix 5.J, Attachment  
15 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Transmission line  
16 poles and towers also provide perching substrate for raptors, which could result in increased  
17 predation pressure on western yellow-billed cuckoo if they were to use habitat adjacent to lines.

18 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the  
19 study area, its proclivity to remain in the riparian canopy, its presence in the study area during  
20 periods of relative high visibility, and its overall ability to successfully negotiate around overhead  
21 wires that it may encounter. Transmission line poles and towers also provide perching substrate for  
22 raptors, which could result in increased predation pressure on western yellow-billed cuckoo. This  
23 would not be expected to have an adverse effect on the western yellow-billed cuckoo population.

24 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
25 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to  
26 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian  
27 canopy, its presence during periods of relative high visibility, and its overall ability to successfully  
28 negotiate around overhead wires that it may encounter. Transmission line poles and towers also  
29 provide perching substrate for raptors, which could result in increased predation pressure on  
30 western yellow-billed cuckoo. This would be expected to have a less-than-significant impact on the  
31 western yellow-billed cuckoo population.

32 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

33 Noise and visual disturbances associated with construction-related activities could result in  
34 temporary disturbances that affect western yellow-billed cuckoo use of modeled habitat adjacent to  
35 proposed construction areas. Construction noise above background noise levels (greater than 50  
36 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
37 *Attachment 5J.D, Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
38 *Crane, Table 4*), although there are no available data to determine the extent to which these noise  
39 levels could affect western yellow-billed cuckoo. Indirect effects associated with construction  
40 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
41 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.  
42 If western yellow-billed cuckoo were to nest in or adjacent to work areas, construction and  
43 subsequent maintenance-related noise and visual disturbances could mask calls, disrupt foraging

1 and nesting behaviors, and reduce the functions of suitable nesting habitat for these species. These  
2 potential effects would be minimized with incorporation of *AMM22 Suisun Song Sparrow, Yellow-*  
3 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* into the BDCP. The use of mechanical  
4 equipment during water conveyance facilities construction could cause the accidental release of  
5 petroleum or other contaminants that could affect western yellow-billed cuckoo in the surrounding  
6 habitat. The inadvertent discharge of sediment or excessive dust adjacent to western yellow-billed  
7 cuckoo habitat could also affect the species. *AMM1–AMM7*, including *AMM2 Construction BMPs and*  
8 *Monitoring*, in addition to *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*  
9 *Western Yellow-Billed Cuckoo*, would minimize the likelihood of such spills and ensure that measures  
10 were in place to prevent runoff from the construction area and any adverse effects of dust on active  
11 nests.

12 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Plan implementation  
13 could have adverse effects on the species through the modification of habitat and potential for direct  
14 mortality. However, due to the species' minimal presence in the study area, and with the  
15 incorporation of *AMM1–AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
16 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, indirect effects would not have an adverse effect  
17 on western yellow-billed cuckoo.

18 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 1B  
19 implementation could have a significant impact on the species from modification of habitat. With the  
20 incorporation of *AMM1–AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
21 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, indirect effects as a result of Alternative 1B  
22 implementation would have a less-than-significant impact on western yellow-billed cuckoo.

### 23 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a** 24 **Result of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
26 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo  
27 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased  
28 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the  
29 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian  
30 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and  
31 changes to frequency and inundation would be within the tolerance of these vegetation types.

32 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
33 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding  
34 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect  
35 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside  
36 the period the floodplains would likely be inundated, and periodic inundation of floodplains is  
37 expected to restore a more natural flood regime in support of riparian vegetation types that provide  
38 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal  
39 inundation in existing riparian natural communities is likely to be beneficial for western yellow-  
40 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological  
41 processes in riparian areas, and flooding promotes the germination and establishment of many  
42 native riparian plants.

1 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if  
2 they were to establish as breeders in the study area, because flooding is expected to occur outside of  
3 the breeding season.

4 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on  
5 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is  
6 expected to occur outside of the breeding season.

## 7 **White-Tailed Kite**

8 This section describes the effects of Alternative 1B, including water conveyance facilities  
9 construction and implementation of other conservation components, on white-tailed kite. The  
10 habitat model used to assess impacts on white-tailed kite includes nesting habitat and foraging  
11 habitat. Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian  
12 forests, valley oak woodlands, or other groups of trees and are usually associated with compatible  
13 foraging habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996).  
14 Modeled foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and  
15 grain crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen  
16 1995).

17 Construction and restoration associated with Alternative 1B conservation measures would result in  
18 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-  
19 1B-41. The majority of the losses would take place over an extended period of time as tidal marsh is  
20 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be  
21 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)  
22 for restored habitats to replace the functions of habitat lost. This time lag between impacts and  
23 restoration of habitat function would be minimized by specific requirements of *AMM18 Swainson's*  
24 *Hawk and White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
25 implementation of Alternative 1B would also include the following biological objectives over the  
26 term of the BDCP to benefit the white-tailed kite (BDCP Chapter 3, *Conservation Strategy*).

- 27 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
28 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
29 associated with CM7).
- 30 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
31 10 (Objective VFRNC1.2, associated with CM3).
- 32 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
33 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
34 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 35 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 36 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
37 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 38 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
39 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 40 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
41 VPNC2.5, and GNC2.4, associated with CM11).

- 1 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
2 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 3 • Plant and maintain native trees along roadsides and field borders within protected cultivated  
4 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 5 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
6 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
7 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
8 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 9 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
10 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11)

11 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
12 management activities that would enhance these natural communities for the species and  
13 implementation of AMM1–AMM7 and *AMM18 Swainson’s Hawk and White-tailed Kite*, impacts on  
14 white-tailed kite would not be adverse for NEPA purposes and would be less than significant for  
15 CEQA purposes.

16 **Table 12-1B-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 1B**  
17 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	40	40	39	39	NA	NA
	Foraging	5,475	5,475	9,594	9,594	NA	NA
<b>Total Impacts CM1</b>		<b>5,515</b>	<b>5,515</b>	<b>9,633</b>	<b>9,633</b>		
CM2–CM18	Nesting	312	507	88	121	48–82	230
	Foraging	8,723	52,675	516	1,484	3,030–6,651	7,402
<b>Total Impacts CM2–CM18</b>		<b>9,035</b>	<b>53,182</b>	<b>604</b>	<b>1,605</b>	<b>3,078–6,733</b>	<b>7,632</b>
<b>Total Nesting</b>		<b>352</b>	<b>547</b>	<b>127</b>	<b>160</b>	48–82	230
<b>Total Foraging</b>		<b>14,198</b>	<b>58,150</b>	<b>10,110</b>	<b>11,078</b>	3,030–6,651	7,402
<b>TOTAL IMPACTS</b>		<b>14,550</b>	<b>58,697</b>	<b>10,237</b>	<b>11,238</b>	<b>3,078–6,733</b>	<b>7,632</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

## 1 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

2 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
3 of up to 69,935 acres of modeled habitat (707 acres of nesting habitat and 69,388 acres of foraging  
4 habitat) for white-tailed kite (Table 12-1B-41). Conservation measures that would result in these  
5 losses are conveyance facilities and transmission line construction, and establishment and use of  
6 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
7 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),  
8 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
9 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
10 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
11 In addition, maintenance activities associated with the long-term operation of the water conveyance  
12 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of  
13 these individual activities is described below. A summary statement of the combined impacts and  
14 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B water conveyance facilities  
16 would result in the combined permanent and temporary loss of up to 79 acres of white-tailed  
17 kite nesting habitat (40 acres of permanent loss and 39 acres of temporary loss). The habitat  
18 would be removed at multiple locations from the north Delta to the east Delta and in the vicinity  
19 of Clifton Court Forebay. Almost all of the losses would occur on the borders of waterways. In  
20 the north Delta, most of the permanent loss would occur where Intakes 1–5 encroach on the  
21 Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very  
22 small patches, some dominated by valley oak and others by nonnative trees and scrub  
23 vegetation. Other small patches or narrow bands of riparian vegetation dominated by valley oak,  
24 willow, cottonwood or mixed brambles would be permanently removed by canal construction  
25 adjacent to Intake 1, between Intakes 2 and 4, and just south of Lambert Road. In the east Delta,  
26 small permanent losses would occur from canal construction just south of Twin Cities Road and  
27 just north of Walnut Grove Road. The temporary riparian losses would occur at the intake sites  
28 along the Sacramento River and at temporary siphon work areas where the canal would cross  
29 Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad  
30 Canal, and Middle River just south of Victoria Canal.

31 In addition, 15,069 acres of foraging habitat would be removed (5,475 acres of permanent loss,  
32 9,594 acres of temporary loss; Table 12-1B-41). The foraging habitat losses would occur at  
33 various locations along the new canal route from the construction of the canal and the  
34 associated borrow and spoil sites and at the intake sites along the Sacramento River. Permanent  
35 and temporary losses of foraging habitat would also occur at the new forebay site just south of  
36 Clifton Court Forebay and associated borrow and spoil sites. There are no occurrences of white-  
37 tailed kite that overlap with the CM1 construction footprint. However, the implementation of  
38 *AMM18 Swainson’s Hawk and White-Tailed Kite* would minimize effects on white-tailed kites if  
39 they were to nest within or adjacent to the construction footprint. Refer to the Terrestrial  
40 Biology Map Book for a detailed view of Alternative 1B construction locations.

- 41 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
42 would result in the combined permanent and temporary loss of up to 170 acres of nesting  
43 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
44 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516  
45 acres of temporary loss). Activities through CM2 could involve excavation and grading in  
46 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the

1 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
2 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
3 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur  
4 during the first 10 years of Alternative 1B implementation.

- 5 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
6 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting  
7 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of  
8 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
9 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
10 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
11 directly impact and fragment grassland just north of Rio Vista in and around French and  
12 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
13 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
14 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over  
15 fairly broad areas within the tidal restoration footprints could result in the removal or  
16 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees  
17 would not be actively removed but tree mortality would be expected over time as areas became  
18 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the  
19 local nesting population.
- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
21 seasonally inundated floodplain and riparian restoration actions would remove approximately  
22 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary  
23 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary  
24 loss). These losses would be expected after the first 10 years of Alternative 1B implementation  
25 along the San Joaquin River and other major waterways in CZ 7.
- 26 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
27 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and  
28 3,991 acres as part of seasonal floodplain restoration through CM7.
- 29 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
30 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-  
31 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.  
32 If agricultural lands supporting higher value foraging habitat than the restored grassland were  
33 removed, there would be a loss of white-tailed kite foraging habitat value.
- 34 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh  
35 (CM10) would result in the permanent conversion of 1,440 acres of cultivated lands to nontidal  
36 marsh in CZ 2 and CZ 4. This would not result in a loss of foraging habitat as both natural  
37 communities are foraging habitat for white-tailed kite. Small patches of riparian vegetation that  
38 support White-tailed kite nesting habitat may develop along the margins of restored nontidal  
39 marsh restoration would also provide foraging habitat for the species.
- 40 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
41 enhancement-related activities could disturb white-tailed kite nests if they were present near  
42 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
43 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
44 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until  
45 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation

1 and road and other infrastructure maintenance, are expected to have minor effects on available  
2 white-tailed kite habitat and are expected to result in overall improvements to and maintenance  
3 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected  
4 to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also  
5 include the construction of recreational-related facilities including trails, interpretive signs, and  
6 picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
7 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
8 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
9 of white-tailed kite grassland foraging habitat would be lost from the construction of trails and  
10 facilities.

- 11 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
12 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation  
13 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Alternative 1B  
14 implementation.

15 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation  
16 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected  
17 nesting habitat would be restored as riparian habitat within 1 year following completion of  
18 construction activities. The restored riparian habitat would require 1 to several decades to  
19 functionally replace habitat that has been affected and for trees to attain sufficient size and  
20 structure suitable for nesting by white-tailed kite. *AMM18 Swainson's Hawk and White-Tailed*  
21 *Kite* contains actions described below to reduce the effect of temporal loss of nesting habitat,  
22 including the transplanting of mature trees and planting of trees near high-value foraging  
23 habitat. The functions of agricultural and grassland communities that provide foraging habitat  
24 for white-tailed kite are expected to be restored relatively quickly.

- 25 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
27 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance  
28 activities would include vegetation management, levee and structure repair, and re-grading of  
29 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7  
30 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
31 described below.
- 32 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
33 direct mortality of adult or fledged white-tailed kite if they were present in the Plan Area,  
34 because they would be expected to avoid contact with construction and other equipment.  
35 However, if white-tailed kite were to nest in the construction area, construction-related  
36 activities, including equipment operation, noise and visual disturbances could affect nests or  
37 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
38 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
39 *Tailed Kite* into the BDCP.

40 The following paragraphs summarize the combined effects discussed above and describe other  
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
42 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
5 the effect of construction would not be adverse under NEPA. The Plan would remove 479 acres (352  
6 acres of permanent loss, 127 acres of temporary loss) of white-tailed kite nesting habitat in the  
7 study area in the near-term. These effects would result from the construction of the water  
8 conveyance facilities (CM1, 79 acres), and implementing other conservation measures (CM2 *Yolo*  
9 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
10 *Inundated Floodplain Restoration*—400 acres). In addition, 24,308 acres of white-tailed kite foraging  
11 habitat would be removed or converted in the near-term (CM1, 15,069 acres; CM2 *Yolo Bypass*  
12 *Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally Inundated*  
13 *Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland Natural*  
14 *Community Restoration*, CM9 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, CM11  
15 *Natural Communities Enhancement and Management* and CM18 *Conservation Hatcheries*—9,239  
16 acres).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
18 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
19 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
20 for nesting habitat, 1:1 protection for foraging habitat. Using these ratios would indicate that 79  
21 acres of nesting habitat should be restored/ created and 79 acres should be protected to mitigate  
22 the CM1 losses of white-tailed kite nesting habitat. In addition, 15,069 acres of foraging habitat  
23 should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The  
24 near-term effects of other conservation actions would remove 400 acres of modeled nesting habitat,  
25 and therefore require 400 acres of protection of nesting habitat. Similarly, the near-term effects of  
26 other conservation actions would result in the loss or conversion of 9,239 acres of modeled foraging  
27 habitat, and therefore require 9,239 acres of protection of foraging habitat using the same typical  
28 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of nesting habitat; 1:1 for  
29 protection of foraging habitat).

30 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
31 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
32 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
33 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
34 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
35 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
36 actions are associated with CM3, CM4, CM7, and CM8 and would occur in the same timeframe as the  
37 construction and early restoration losses.

38 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
39 system with extensive wide bands or large patches of valley/foothill riparian natural community  
40 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
41 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
42 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
43 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
44 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
45 would be increased by planting and maintaining native trees along roadsides and field borders



1 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
2 small but essential nesting habitat associated with cultivated lands would also be maintained and  
3 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
4 farmyards or at rural residences (Objective CLNC1.3).

5 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
6 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
7 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
8 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
9 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
10 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
11 the foraging value of these natural communities (Objectives ASWNC2.4,VPNC2.5, and GNC2.4).  
12 Foraging opportunities would also be improved by enhancing prey populations through the  
13 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
14 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
15 would also be protected and maintained as part of the cultivated lands reserve system which would  
16 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
17 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
18 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
19 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres  
20 of tidal natural communities, including transitional uplands would provide high-value foraging  
21 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for  
22 covered and other native wildlife species would be protected in the near-term time period  
23 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection  
24 and restoration efforts and represent performance standards for considering the effectiveness of  
25 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
26 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
27 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate  
28 the near-term effects of the other conservation measures.

29 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
30 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
31 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
32 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
33 require one to several decades to functionally replace habitat that has been affected and for trees to  
34 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
35 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
36 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
37 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
38 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
39 would further reduce this limited resource and could reduce or restrict the number of active white-  
40 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

41 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
42 trees, including transplanting trees scheduled for removal. These would be supplemented with  
43 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
44 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
45 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
46 system for every tree 20 feet or taller anticipated to be removed by construction during the near-

1 term period. A variety of native tree species would be planted to provide trees with differing growth  
2 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in areas  
3 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
4 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
5 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
6 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
7 single region of the Plan Area, but would be distributed throughout the lands protected as foraging  
8 habitat for white-tailed kite. With this program in place, Alternative 1B would not have a substantial  
9 adverse effect on white-tailed kite in the near-term timeframe, either through direct mortality or  
10 through habitat modifications.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
16 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
17 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 18 **Late Long-Term Timeframe**

19 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres  
20 of modeled foraging habitat for white-tailed kite. Alternative 1A as a whole would result in the  
21 permanent loss of and temporary effects on 707 acres of potential nesting habitat (5% of the  
22 potential nesting habitat in the study area) and the loss or conversion of 69,388 acres of foraging  
23 habitat (14% of the foraging habitat in the study area). The locations of these losses are described  
24 above in the analyses of individual conservation measures.

25 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
26 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
27 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
28 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
29 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
30 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
31 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that  
32 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal  
33 wetlands (Table 3-4 in Chapter 3).

34 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
35 system with extensive wide bands or large patches of valley/foothill riparian natural community  
36 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
37 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
38 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
39 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
40 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
41 would be increased by planting and maintaining native trees along roadsides and field borders  
42 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
43 small but essential nesting habitat associated with cultivated lands would also be maintained and

1 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
2 farmyards or at rural residences (Objective CLNC1.3).

3 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
4 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
5 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
6 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
7 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
8 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
9 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
10 Foraging opportunities would also be improved by enhancing prey populations through the  
11 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
12 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
13 would also be protected and maintained as part of the cultivated lands reserve system which would  
14 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
15 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
16 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
17 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least  
18 65,000 acres of tidal natural communities, including transitional uplands would provide high-value  
19 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide  
20 foraging habitat for white-tailed kite would be protected by the late long-term time period  
21 (Objective CLNC1.1).

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
23 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
24 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
25 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
27 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
28 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
31 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
32 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

33 **NEPA Effects:** The loss of white-tailed kite habitat and potential for direct mortality of this special-  
34 status species under Alternative 1B would represent an adverse effect in the absence of other  
35 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,  
36 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and  
37 *AMM18 Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the  
38 construction period, the effects of habitat loss and potential mortality on white-tailed kite under  
39 Alternative 1B would not be adverse.

#### 40 **CEQA Conclusion:**

#### 41 **Near-Term Timeframe**

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
2 the effect of construction would be less than significant under CEQA. The Plan would remove 479  
3 acres (352 acres of permanent loss, 127 acres of temporary loss) of white-tailed kite nesting habitat  
4 in the study area in the near-term. These effects would result from the construction of the water  
5 conveyance facilities (CM1, 79 acres), and implementing other conservation measures (CM2 *Yolo*  
6 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
7 *Inundated Floodplain Restoration*—400 acres). In addition, 24,308 acres of white-tailed kite foraging  
8 habitat would be removed or converted in the near-term (CM1, 15,069 acres; CM2 *Yolo Bypass*  
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10 *Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland Natural*  
11 *Community Restoration*, CM9 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, CM11  
12 *Natural Communities Enhancement and Management* and CM18 *Conservation Hatcheries*—9,239  
13 acres).

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15 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
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18 acres of nesting habitat should be restored/ created and 79 acres should be protected to mitigate  
19 the CM1 losses of white-tailed kite nesting habitat. In addition, 15,069 acres of foraging habitat  
20 should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The  
21 near-term effects of other conservation actions would remove 400 acres of modeled nesting habitat,  
22 and therefore require 400 acres of protection of nesting habitat. Similarly, the near-term effects of  
23 other conservation actions would result in the loss or conversion of 9,239 acres of modeled foraging  
24 habitat, and therefore require 9,239 acres of protection of foraging habitat using the same typical  
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30 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
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33 actions are associated with CM3, CM4, CM7, and CM8 and would occur in the same timeframe as the  
34 construction and early restoration losses.

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36 system with extensive wide bands or large patches of valley/foothill riparian natural community  
37 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
38 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
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41 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
42 would be increased by planting and maintaining native trees along roadsides and field borders  
43 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
44 small but essential nesting habitat associated with cultivated lands would also be maintained and  
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16 of tidal natural communities, including transitional uplands would provide high-value foraging  
17 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for  
18 covered and other native wildlife species would be protected in the near-term time period  
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20 and restoration efforts and represent performance standards for considering the effectiveness of  
21 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
22 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
23 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate  
24 the near-term effects of the other conservation measures.

25 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
26 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
27 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
28 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
29 require one to several decades to functionally replace habitat that has been affected and for trees to  
30 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
31 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
32 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
33 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
34 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
35 would further reduce this limited resource and could reduce or restrict the number of active white-  
36 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

37 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
38 trees, including transplanting trees scheduled for removal. These would be supplemented with  
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45 the BDCP reserve system in areas that support high value foraging habitat in clumps of at least three  
46 trees each at appropriate sites within or adjacent to conserved cultivated lands, or they could be

1 incorporated as a component of the riparian restoration (CM5, CM7) where they are in close  
2 proximity to suitable foraging habitat. Replacement trees that were incorporated into the riparian  
3 restoration would not be clustered in a single region of the Plan Area, but would be distributed  
4 throughout the lands protected as foraging habitat for white-tailed kite. With this program in place,  
5 Alternative 1B would not have a substantial adverse effect on white-tailed kite in the near-term  
6 timeframe, either through direct mortality or through habitat modifications.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
12 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
13 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

#### 14 **Late Long-Term Timeframe**

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16 of modeled foraging habitat for white-tailed kite. Alternative 1B as a whole would result in the  
17 permanent loss of and temporary effects on 707 acres of potential nesting habitat (5% of the  
18 potential nesting habitat in the study area) and the loss or conversion of 69,388 acres of foraging  
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20 above in the analyses of individual conservation measures.

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
22 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
23 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*  
24 *Restoration to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill*  
25 *riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural*  
26 *community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland*  
27 *complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that*  
28 *provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal*  
29 *wetlands (Table 3-4 in Chapter 3).*

30 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
31 system with extensive wide bands or large patches of valley/foothill riparian natural community  
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33 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
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36 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
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39 small but essential nesting habitat associated with cultivated lands would also be maintained and  
40 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
41 farmyards or at rural residences (Objective CLNC1.3).

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44 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous

1 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
2 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
3 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
4 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
5 Foraging opportunities would also be improved by enhancing prey populations through the  
6 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
7 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
8 would also be protected and maintained as part of the cultivated lands reserve system which would  
9 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
10 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
11 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
12 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least  
13 65,000 acres of tidal natural communities, including transitional uplands would provide high-value  
14 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide  
15 foraging habitat for white-tailed kite would be protected by the late long-term time period  
16 (Objective CLNC1.1).

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
18 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
19 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
20 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
26 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
27 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

28 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
29 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
30 restoring riparian and foraging habitats lost to construction and restoration activities, and with  
31 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
32 habitat or direct mortality through implementation of Alternative 1B would not result in a  
33 substantial adverse effect through habitat modifications and would not substantially reduce the  
34 number or restrict the range of the species. In particular, 95% of the loss of foraging habitat effects  
35 involve the conversion of one habitat type to another form of suitable foraging habitat. Therefore,  
36 the loss of habitat or potential mortality under this alternative would have a less-than-significant  
37 impact on white-tailed kite.

### 38 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 39 **Facilities**

40 New transmission lines would increase the risk that white-tailed kites could be subject to power line  
41 strikes and/or electrocution, which could result in injury or mortality of individuals. This species  
42 would be at low risk of bird strike mortality based on its general maneuverability, its keen eyesight,  
43 and lack of flocking behavior (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*  
44 *BDCP Transmission Lines*). *AMM20 Greater Sandhill Crane* would further reduce any potential effects.

1 **NEPA Effects:** New transmission lines would minimally increase the risk for white-tailed kite power  
2 line strikes. However, the species would be at a low risk of bird strike mortality based on its general  
3 maneuverability, its keen eyesight and lack of flocking behavior. With the implementation of *AMM20*  
4 *Greater Sandhill Crane* the potential effect of the construction of new transmission lines on white-  
5 tailed kite would not be adverse.

6 **CEQA Conclusion:** New transmission lines would increase the risk for white-tailed kite power line  
7 strikes and/or electrocution. However, the species would be at a low risk of bird strike mortality  
8 based on its general maneuverability, its keen eyesight and lack of flocking behavior. *AMM20 Greater*  
9 *Sandhill Crane*, would further reduce any potential impact of the construction of new transmission  
10 lines on white-tailed kite to a less-than-significant level.

### 11 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

12 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be  
13 indirectly affected by construction activities. Construction noise above background noise levels  
14 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
15 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
16 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
17 which these noise levels could affect white-tailed kite. Indirect effects associated with construction  
18 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
19 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.  
20 If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent  
21 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
22 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM18 Swainson's*  
23 *Hawk and White-Tailed Kite* would require preconstruction surveys, and if detected, 200 yard no  
24 disturbance buffers would be established around active nests. The use of mechanical equipment  
25 during water conveyance facilities construction could cause the accidental release of petroleum or  
26 other contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent  
27 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the  
28 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,  
29 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
30 from the construction area and negative effects of dust on active nests.

31 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
32 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain  
33 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
34 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
35 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
36 restoration activities that create newly inundated areas could increase bioavailability of mercury  
37 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
38 associated with natural community and floodplain restoration may indirectly affect white-tailed kite  
39 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of  
40 methylmercury within the study area varies with site-specific conditions and would need to be  
41 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
42 specific Mercury Management Plans. Site-specific restoration plans that address the creation and  
43 mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
44 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and  
45 potential impacts on white-tailed kite.



1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
5 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
6 classes within a species. In addition, the effect of selenium on a species can be confounded by  
7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
18 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
23 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal  
24 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
25 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
26 restoration activities that create newly inundated areas could increase bioavailability of selenium  
27 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
28 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
29 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
30 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
31 difficult to determine whether the effects of potential increases in selenium bioavailability  
32 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse  
33 effects on white-tailed kite.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a  
35 substantial effect on white-tailed kite from increases in selenium associated with restoration  
36 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
37 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
38 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
39 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
40 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
41 separately for each restoration effort as part of design and implementation. This avoidance and  
42 minimization measure would be implemented as part of the tidal habitat restoration design  
43 schedule.

44 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
45 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation

1 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
2 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the  
3 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and  
4 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative  
5 1B would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7,  
6 and *AMM18 Swainson's Hawk and White-Tailed Kite*. Tidal habitat restoration could result in  
7 increased exposure of white-tailed kite to selenium. This effect would be addressed through the  
8 implementation of *AMM27 Selenium Management* which would provide specific tidal habitat  
9 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
10 bioavailability in tidal habitats. The indirect effects associated with noise and visual disturbances,  
11 potential spills of hazardous material, and increased exposure to selenium from Alternative 1B  
12 implementation would not have an adverse effect on white-tailed kite. Tidal habitat restoration is  
13 unlikely to have an adverse effect on white-tailed kite through increased exposure to  
14 methylmercury, as kites currently forage in tidal marshes where elevated methylmercury levels  
15 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
16 the potential for increased exposure varies substantially within the study area. Site-specific  
17 restoration plans in addition to monitoring and adaptive management, described in CM12  
18 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
19 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
20 assess the potential for risk of methylmercury exposure for white-tailed kite, once site specific  
21 sampling and other information could be developed.

22 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
23 operations and maintenance of the water conveyance facilities under Alternative 1B would have a  
24 less-than-significant impact on white-tailed kite with the implementation of *AMM18 Swainson's*  
25 *Hawk and White-Tailed Kite*, and AMMs1–7. Tidal habitat restoration could result in increased  
26 exposure of white-tailed kite to selenium. This effect would be addressed through the  
27 implementation of *AMM27 Selenium Management* which would provide specific tidal habitat  
28 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
29 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
30 floodplain restoration could result in increased exposure of white-tailed kite to methylmercury.  
31 However, it is unknown what concentrations of methylmercury are harmful to this species. *CM12*  
32 *Methylmercury Management* includes provisions for project-specific Mercury Management Plans.  
33 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
34 monitoring and adaptive management as described in CM12, would better inform potential impacts  
35 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area on  
36 white-tailed kite. With these measures in place, the indirect effects associated with noise and visual  
37 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
38 Alternative 1B implementation would have a less-than-significant impact on white-tailed kite.

### 39 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of** 40 **Implementation of Conservation Components**

41 Flooding of the Yolo Bypass from Fremont Weir operations related to *CM2 Yolo Bypass Fisheries*  
42 *Enhancement* would increase the frequency and duration of inundation on approximately 48–82  
43 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed  
44 kite foraging habitat (Table 12-1B-41). During inundation years, affected cultivated lands and  
45 grassland would not be available as foraging habitat until prey populations have re-inhabited

1 inundated areas. This would result in temporary periodic reduction in availability of foraging  
2 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,  
3 there could be a further loss of foraging habitat value if the crop type that would have been planted  
4 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite  
5 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse  
6 effect on nest sites that may be within the inundation area because existing trees already withstand  
7 floods in the area, the increase in inundation frequency and duration is expected to remain within  
8 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

9 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
10 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402  
11 acres of modeled white-tailed kite foraging habitat (Table 12-1B-41). Inundation of foraging habitat  
12 could result in a periodic reduction of available foraging habitat due to the reduction in available  
13 prey. Following draw-down, inundated habitats are expected to recover and provide suitable  
14 foraging conditions until the following inundation period. Thus, this is considered a periodic impact  
15 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the Plan  
16 Area.

17 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more  
18 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting  
19 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because  
20 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

21 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite  
22 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
23 draw-down. Any effects are considered short-term and would not result in an adverse effect.

24 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite  
25 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
26 draw-down. Any effects are considered short-term and would be expected to have a less-than-  
27 significant impact on white-tailed kite.

## 28 **Yellow-Breasted Chat**

29 This section describes the effects of Alternative 1B, including water conveyance facilities  
30 construction and implementation of other conservation components, on yellow-breasted chat.  
31 Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant  
32 alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an  
33 overstory component. Primary nesting and migratory habitat is qualitatively distinguished from  
34 secondary habitat in Delta areas as those plant associations that support a greater percentage of a  
35 suitable shrub cover, particularly blackberry, and California wild rose, and have an open to  
36 moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No  
37 distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats  
38 because supporting information is lacking. For this reason, the effects analysis only provides the  
39 breakdown between primary and secondary habitat in the habitat loss totals and associated tables,  
40 and does not provide this breakdown in the text by activity or effect type.

41 Construction and restoration associated with Alternative 1B conservation measures would result in  
42 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table  
43 12-1B-42. Full implementation of Alternative 1B would also include the following conservation

1 actions over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,  
2 *Biological Goals and Objectives*).

- 3 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
4 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
5 associated with CM7).
- 6 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
7 10 (Objective VFRNC1.2, associated with CM3).
- 8 ● Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
9 overlap among vegetation components and over adjacent riverine channels, freshwater  
10 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 11 ● Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed  
12 understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,  
13 associated with CM7).

14 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
15 management activities that would enhance these natural communities for the species and  
16 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
17 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for  
18 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 1B**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	<i>Primary</i>	9	9	21	21	NA	NA
	<i>Secondary</i>	15	15	8	8	NA	NA
	<i>Suisun Marsh/ Upper Yolo Bypass</i>	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>24</b>	<b>24</b>	<b>29</b>	<b>29</b>		
CM2–CM18	<i>Primary</i>	96	214	58	73	19–38	92
	<i>Secondary</i>	209	357	0	6	6–18	56
	<i>Suisun Marsh/ Upper Yolo Bypass</i>	76	85	29	29	23–32	0
<b>Total Impacts CM2–CM18</b>		<b>381</b>	<b>656</b>	<b>87</b>	<b>108</b>	<b>48–88</b>	<b>148</b>
<b>Total Primary</b>		<b>105</b>	<b>223</b>	<b>79</b>	<b>94</b>		
<b>Total Secondary</b>		<b>224</b>	<b>372</b>	<b>8</b>	<b>14</b>		
<b>Total Suisun Marsh/Upper Yolo Bypass</b>		<b>76</b>	<b>85</b>	<b>29</b>	<b>29</b>		
<b>TOTAL IMPACTS</b>		<b>405</b>	<b>680</b>	<b>116</b>	<b>137</b>	<b>48–88</b>	<b>148</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**  
5 **Chat**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
7 of up to 817 acres of modeled nesting and migratory habitat for yellow-breasted chat (680 acres of  
8 permanent loss, 137 acres of temporary loss (Table 12-1B-42). Conservation measures that would  
9 result in these losses are conveyance facilities and transmission line construction, and establishment  
10 and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal  
11 habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
12 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,  
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
15 degrade or eliminate yellow-breasted chat habitat. Each of these individual activities is described  
16 below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion  
17 follow the individual conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would  
2 result in the combined permanent and temporary loss of up 30 acres of primary habitat (9 acres  
3 of permanent loss, 21 acres of temporary loss). In addition, 22 acres of secondary habitat would  
4 be removed (10 acres of permanent loss, 12 acres of temporary loss) (Table 12-1B-42). The  
5 habitat would be removed at multiple locations from the north Delta to the east Delta and in the  
6 vicinity of Clifton Court Forebay. Almost all of the losses would occur on the borders of  
7 waterways. In the north Delta, most of the permanent loss would occur where Intakes 1–5  
8 encroach on the Sacramento River’s east bank between Freeport and Courtland. The riparian  
9 areas here are very small patches, some dominated by valley oak and others by nonnative trees  
10 and scrub vegetation. In the east Delta, small permanent losses would occur from canal  
11 construction just south of Twin Cities Road and just north of Walnut Grove Road. A small area of  
12 riparian habitat (mostly blackberries) would be permanently removed in the south Delta at the  
13 new forebay construction site. The temporary riparian losses would occur at the intake sites  
14 along the Sacramento River and at temporary siphon work areas where the canal would cross  
15 Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad  
16 Canal, and Middle River just south of Victoria Canal. Tunnel construction at Old River just south  
17 of Victoria Canal would also temporarily remove mixed willows and brambles. There are no  
18 occurrences of yellow-breasted chat that overlap with the CM1 construction footprint. The  
19 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western*  
20 *Yellow-Billed Cuckoo* would minimize effects on yellow-breasted chat if they were to nest within  
21 or adjacent to the construction footprint. Refer to the Terrestrial Biology Map Book for a  
22 detailed view of Alternative 1B construction locations.
- 23       ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction would permanently remove  
24 approximately 83 acres and temporarily remove 88 acres of yellow-breasted chat habitat in the  
25 Yolo Bypass in CZ 2. The loss is expected to occur during the first 10 years of Alternative 1B  
26 implementation.
- 27       ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
28 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat  
29 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting  
30 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of  
31 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.
- 32       ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
33 seasonally inundated floodplain would permanently and temporarily remove approximately 49  
34 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of  
35 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.  
36 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of  
37 valley/foothill riparian habitat would be restored as a component of seasonally inundated  
38 floodplain restoration actions. The actual number of acres that would be restored may differ  
39 from these estimates, depending on how closely the outcome of seasonally inundated floodplain  
40 restoration approximates the assumed outcome. Once this restored riparian vegetation has  
41 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat  
42 habitat.
- 43       ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
44 activities that could be implemented in protected yellow-breasted chat habitats would be  
45 expected to maintain and improve the functions of the habitat over the term of the BDCP.

1 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which  
2 would maintain conditions favorable for the chat's use of the Plan Area.

3 Habitat management- and enhancement-related activities could disturb yellow-breasted chat  
4 nests if they are present near work sites. Equipment operation could destroy nests, and noise  
5 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and  
6 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
7 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-  
8 breasted chat or other adverse effects.

9 Occupied habitat would be monitored to determine if there is a need to implement controls on  
10 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions  
11 would be expected to benefit the yellow-breasted chat by removing a potential stressor that  
12 could, if not addressed, adversely affect the stability of newly established populations.

13 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
14 *and Management* that are designed to enhance wildlife values in restored riparian habitats may  
15 result in localized ground disturbances that could temporarily remove small amounts of yellow-  
16 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
17 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
18 on available yellow-breasted chat habitat and are expected to result in overall improvements to  
19 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 20 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
21 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
22 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding  
23 habitat. Maintenance activities would include vegetation management, levee and structure  
24 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
25 reduced by AMMs and conservation actions as described below.
- 26 ● Injury and Direct Mortality: Construction is not expected to result in direct mortality of yellow-  
27 breasted chat because adults and fledged young are expected to occur only in very small  
28 numbers and, if present, would avoid contact with construction and other equipment. If yellow-  
29 breasted chat were to nest in the vicinity of construction activities, equipment operation could  
30 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*  
31 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid  
32 and minimize this effect.
- 33 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
34 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
35 Temporarily affected areas would be restored as riparian habitat within 1 year following  
36 completion of construction activities. Although the effects are considered temporary, the  
37 restored riparian habitat would require 5 years to several decades, for ecological succession to  
38 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
39 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
40 therefore, the replaced riparian vegetation would be expected to have structural components  
41 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
42 restoration activities are complete.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
3 included.

#### 4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
8 effects of construction would not be adverse under NEPA. The Plan would remove 521 acres of  
9 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would  
10 result from the construction of the water conveyance facilities (CM1, 53 acres of modeled nesting  
11 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
12 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
13 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would  
14 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value  
15 habitat for the species.

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
17 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
18 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
19 habitat. Using these ratios would indicate that 53 acres of valley/foothill riparian habitat should be  
20 restored/created and 53 acres should be protected to compensate for the CM1 losses of yellow-  
21 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
22 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
23 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
24 protection).

25 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
26 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
27 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
28 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
29 yellow-breasted chat. The majority of the riparian restoration acres would occur in CZ 7 as part of a  
30 reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
31 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals  
32 and objectives in the Plan for riparian restoration also include the restoration, maintenance and  
33 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among  
34 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and  
35 grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural habitat  
36 requirements, so only the early- to mid-successional portions of the restored and protected riparian  
37 natural would be expected to provide suitable habitat characteristics for the species. These natural  
38 community biological goals and objectives would inform the near-term protection and restoration  
39 efforts and represent performance standards for considering the effectiveness of conservation  
40 actions for the species.

41 The acres of protection contained in the near-term Plan goals and the additional detail in the  
42 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
43 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
44 conservation measures. The restored riparian habitat could require 5 years to several decades, for



1 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
2 has been affected. However, because the modeled habitat impacted largely consists of small patches  
3 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse  
4 population-level effect on the species in the near-term time period.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
10 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
11 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
12 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
13 *Measures*.

#### 14 **Late Long-Term Timeframe**

15 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
16 nesting and migratory habitat for yellow-breasted chat. Alternative 1B as a whole would result in  
17 the permanent loss of and temporary effects on 817 acres of modeled habitat (6% of the modeled  
18 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
19 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
20 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
21 would be in fragmented riparian habitat throughout the study area.

22 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
23 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
24 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
25 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
26 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
27 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
28 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
29 the restored and protected riparian natural would be expected to provide suitable habitat  
30 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
31 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
32 natural erosion and deposition, which would provide conditions conducive to the establishment of  
33 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
34 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
35 population in the Plan Area, a cowbird control program would be implemented through *CM11*  
36 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian  
37 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
38 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
40 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
41 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
42 chat.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
4 *Least Bell's Vireo, Western Yellow-Billed Cuckoo. All of these AMMs include elements that would*  
5 *avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and*  
6 *storage sites. The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization*  
7 *Measures.*

8 **NEPA Effects:** The loss of western yellow-breasted chat habitat and potential direct mortality of this  
9 special-status species would represent an adverse effect in the absence of other conservation  
10 actions. The restored riparian habitat would require 5 years to several decades for ecological  
11 succession to occur and a similar period of time for restored riparian habitat to functionally replace  
12 habitat that has been affected. However, the habitat that would be lost consists of small, fragmented  
13 riparian stands that would not provide high-value habitat for the species. And because the nesting  
14 and migratory habitat that would be lost is small relative to the species range throughout California  
15 and North America, BDCP actions would not be expected to have an adverse population-level effect  
16 on the species. With habitat protection and restoration associated with CM3, CM7, and CM11, guided  
17 by biological goals and objectives and by *AMM1 Worker Awareness Training, AMM2 Construction Best*  
18 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*  
19 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*  
20 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, AMM7 Barge*  
21 *Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
22 *Yellow-Billed Cuckoo, which would be in place throughout the construction period, the effects of*  
23 *habitat loss and potential mortality on yellow-breasted chat under Alternative 1B would not be*  
24 *adverse.*

25 **CEQA Conclusion:**

26 **Near-Term Timeframe**

27 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
28 term BDCP conservation strategy has been evaluated to determine whether it would provide  
29 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
30 impact of construction would be less than significant under CEQA. The Plan would remove 521 acres  
31 of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would  
32 result from the construction of the water conveyance facilities (CM1, 53 acres of modeled nesting  
33 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
34 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
35 *Restoration—468 acres of modeled nesting and migratory habitat). These habitat losses would*  
36 *primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value*  
37 *habitat for the species.*

38 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
39 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
40 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
41 habitat. Using these ratios would indicate that 53 acres of valley/foothill riparian habitat should be  
42 restored/created and 53 acres should be protected to compensate for the CM1 losses of yellow-  
43 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
44 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of

1 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
2 protection).

3 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
4 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These  
5 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as  
6 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
7 yellow-breasted chat. The majority of the riparian restoration acres would occur in CZ 7 as part of a  
8 reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
9 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals  
10 and objectives in the Plan for riparian restoration also include the restoration, maintenance and  
11 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among  
12 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and  
13 grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural habitat  
14 requirements, so only the early- to mid-successional portions of the restored and protected riparian  
15 natural would be expected to provide suitable habitat characteristics for the species. These natural  
16 community biological goals and objectives would inform the near-term protection and restoration  
17 efforts and represent performance standards for considering the effectiveness of conservation  
18 actions for the species.

19 The acres of protection contained in the near-term Plan goals and the additional detail in the  
20 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
21 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
22 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
23 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
24 has been affected. However, because the modeled habitat impacted largely consists of small patches  
25 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have a significant  
26 population-level impact on the species in the near-term time period.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
32 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
33 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
34 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
35 *Measures*.

### 36 **Late Long-Term Timeframe**

37 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
38 nesting and migratory habitat for yellow-breasted chat. Alternative 1B as a whole would result in  
39 the permanent loss of and temporary effects on 817 acres of modeled habitat (6% of the modeled  
40 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
41 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
42 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
43 would be in fragmented riparian habitat throughout the study area.

1 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
2 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
3 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
4 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
5 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
6 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
7 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
8 the restored and protected riparian natural would be expected to provide suitable habitat  
9 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
10 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
11 natural erosion and deposition, which would provide conditions conducive to the establishment of  
12 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
13 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
14 population in the Plan Area, a cowbird control program would be implemented through *CM11*  
15 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian  
16 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
17 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

18 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
19 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
20 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
21 chat.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
27 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
28 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
29 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
30 *Measures*.

31 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
32 of new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
33 restoration activities, and with implementation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow,*  
34 *Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or direct  
35 mortality through implementation of Alternative 1B would not result in a substantial adverse effect  
36 through habitat modifications and would not substantially reduce the number or restrict the range  
37 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have  
38 a less-than-significant impact on western yellow-breasted chat.

#### 39 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing** 40 **the Water Conveyance Facilities**

41 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance  
42 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could  
43 temporarily reduce the extent of and functions supported by the affected habitat. Because of the  
44 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and

1 because *CM5 Seasonally Inundated Floodplain Restoration* would restore and protect contiguous  
2 high-value riparian habitat in CZ 7, any such habitat fragmentation is expected to have no or  
3 minimal effect on the species.

4 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-  
5 breasted chat. The habitat functions for the species would be significantly improved through the  
6 implementation of CM5, which would restore and protect large contiguous patches of riparian  
7 habitat.

8 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on  
9 yellow-breasted chat. The habitat functions for the species would be significantly improved through  
10 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
11 habitat.

### 12 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission** 13 **Facilities**

14 New transmission lines would increase the risk for bird-power line strikes, which could result in  
15 injury or mortality of western yellow-billed cuckoo. Yellow-breasted chats are migratory and  
16 usually arrive at California breeding grounds in April from their wintering grounds in Mexico and  
17 Guatemala. Departure for wintering grounds occurs from August to September. These are periods of  
18 relative high visibility when the risk of powerline collisions will be low. The species' small, relatively  
19 maneuverable body; its foraging behavior; and its presence in the Plan Area during the summer  
20 contribute to a low risk of collision with the proposed transmission lines (BDCP Attachment 5J.C,  
21 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). New transmission lines  
22 would therefore not be expected to have an adverse effect on yellow-breasted chat.

23 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
24 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal  
25 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in  
26 the study area during the summer when visibility is high.

27 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
28 significant impact on yellow-breasted chat because the risk of bird-strike is considered to be  
29 minimal based on the species' small, relatively maneuverable body; its foraging behavior; and its  
30 presence in the study area during the summer when visibility is high.

### 31 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

32 Noise and visual disturbances associated with construction-related activities could result in  
33 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to  
34 proposed construction areas. Construction noise above background noise levels (greater than 50  
35 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
36 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
37 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
38 levels could affect yellow-breasted chat. Indirect effects associated with construction include noise,  
39 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
40 operations outside the project footprint but within 1,300 feet of the construction edge. If yellow-  
41 breasted chat were to nest in or adjacent to work areas, construction and subsequent maintenance-  
42 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and

1 reduce the functions of suitable nesting habitat for these species. These potential effects would be  
2 minimized with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
3 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, which would ensure 250-foot no-disturbance  
4 buffers were established around active nests. The use of mechanical equipment during water  
5 conveyance facilities construction could cause the accidental release of petroleum or other  
6 contaminants that could affect yellow-breasted chat in the surrounding habitat. The inadvertent  
7 discharge of sediment or excessive dust adjacent to yellow-breasted chat habitat could also affect  
8 the species. *AMM1-AMM7*, including *AMM2 Construction BMPs and Monitoring*, in addition to  
9 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*,  
10 would minimize the likelihood of such spills from occurring and ensure that measures were in place  
11 to prevent runoff from the construction area and any adverse effects of dust on active nests. If  
12 present, yellow-breasted chat individuals could be temporarily affected by noise and visual  
13 disturbances adjacent to water conveyance construction sites, *AMM22* would minimize this effect on  
14 the species.

15 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and  
16 sedimentation, and the potential impacts of operations and maintenance of the water conveyance  
17 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of  
18 *AMM1-AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
19 *Yellow-Billed Cuckoo* into the BDCP.

20 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust  
21 and sedimentation, and the potential impacts of operations and maintenance of the water  
22 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the  
23 incorporation of *AMM1-AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
24 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

### 25 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of** 26 **Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
28 duration of inundation of approximately 48-88 acres of modeled yellow-breasted chat nesting and  
29 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or  
30 its habitat are expected because the chat breeding period is outside the period the weir would be  
31 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo  
32 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of  
33 these vegetation types.

34 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148  
35 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to  
36 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the  
37 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains  
38 is expected to restore a more natural flood regime in support of riparian vegetation types that  
39 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal  
40 inundation in existing riparian natural communities is likely to be beneficial because, historically,  
41 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
42 flooding promotes the germination and establishment of many native riparian plants.

1 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain  
2 restoration would be expected to create more natural flood regimes that would support riparian  
3 habitat, which would not result in an adverse effect on yellow breasted chat.

4 **CEQA Conclusion:** By creating more natural flood regimes that would support riparian habitat,  
5 increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain restoration  
6 would have a beneficial impact on yellow breasted chat.

### 7 **Cooper's Hawk and Osprey**

8 This section describes the effects of Alternative 1B, including water conveyance facilities  
9 construction and implementation of other conservation components, on Cooper's hawk and osprey.  
10 Although osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will  
11 nest in more developed landscapes, modeled nesting habitat for these species is restricted to  
12 valley/foothill riparian forest.

13 Construction and restoration associated with Alternative 1B conservation measures would result in  
14 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in  
15 Table 12-1B-43. The majority of the losses would take place over an extended period of time as tidal  
16 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be  
17 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats  
18 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat  
19 function would be minimized by specific requirements of *AMM18 Swainson's Hawk and White-Tailed*  
20 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of  
21 Alternative 1B would include the following conservation actions over the term of the BDCP which  
22 would also benefit Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
23 *Objectives*).

- 24 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
25 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
26 associated with CM7)
- 27 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
28 10 (Objective VFRNC1.2, associated with CM3).
- 29 ● Plant and maintain native trees along roadsides and field borders within protected cultivated  
30 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 31 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
32 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
33 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
34 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

35 As explained below, with the acres of restoration or protection included in the Plan, in addition to  
36 management activities to enhance natural communities for species and implementation of AMM1-  
37 AMM7, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75, impacts on  
38 Cooper's hawk and osprey would not be adverse for NEPA purposes and would be less than  
39 significant for CEQA purposes.

1 **Table 12-1B-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with**  
2 **Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	40	40	39	39	NA	NA
<b>Total Impacts CM1</b>		<b>40</b>	<b>40</b>	<b>39</b>	<b>39</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	312	507	88	121	48–82	230
<b>Total Impacts CM2–CM18</b>		<b>312</b>	<b>507</b>	<b>88</b>	<b>121</b>	<b>48–82</b>	<b>230</b>
<b>TOTAL IMPACTS</b>		<b>352</b>	<b>547</b>	<b>127</b>	<b>160</b>	<b>48–82</b>	<b>230</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**  
5 **Osprey**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
7 of up to 707 acres of modeled nesting habitat (547 acres of permanent loss, 160 acres of temporary  
8 loss) habitat for Cooper’s hawk and osprey (Table 12-1B-43). Conservation measures that would  
9 result in these losses are *CM1 Water Facilities and Operation* (which would involve construction of  
10 conveyance facilities and transmission lines and establishment and use of borrow and spoil areas),  
11 *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5*  
12 *Seasonally Inundated Floodplain Restoration*. Habitat enhancement and management activities  
13 (CM11), which would include ground disturbance or removal of nonnative vegetation, could result  
14 in local adverse habitat effects. In addition, maintenance activities associated with the long-term  
15 operation of the water conveyance facilities and other BDCP physical facilities could affect Cooper’s  
16 hawk and osprey modeled habitat. Each of these individual activities is described below. A summary  
17 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
18 conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B water conveyance facilities  
20 would result in the combined permanent and temporary loss of up to 79 acres of modeled  
21 Cooper’s hawk and osprey habitat (Table 12-1B-43). Of the 79 acres of modeled habitat that  
22 would be removed for the construction of the conveyance facilities, 40 acres would be a  
23 permanent loss and 39 acres would be a temporary loss of habitat. The habitat would be  
24 removed at multiple locations from the north Delta to the east Delta and in the vicinity of Clifton  
25 Court Forebay. Almost all of the losses would occur on the borders of waterways. In the north  
26 Delta, most of the permanent loss would occur where Intakes 1–5 encroach on the Sacramento



1 River's east bank between Freeport and Courtland. The riparian areas here are very small  
2 patches, some dominated by valley oak and others by nonnative trees and scrub vegetation.  
3 Other small patches or narrow bands of riparian vegetation dominated by valley oak, willow,  
4 cottonwood or mixed brambles would be permanently removed by canal construction adjacent  
5 to Intake 1, between Intakes 2 and 4, and just south of Lambert Road. In the east Delta, small  
6 permanent losses would occur from canal construction just south of Twin Cities Road and just  
7 north of Walnut Grove Road. The temporary riparian losses would occur at the intake sites along  
8 the Sacramento River and at temporary siphon work areas where the canal would cross Beaver  
9 Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad Canal, and  
10 Middle River just south of Victoria Canal. There are no occurrences of Cooper's hawk or osprey  
11 that overlap with the construction footprint for CM1. Mitigation Measure BIO-75, *Conduct*  
12 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds* would be available  
13 to address potential effects on Cooper's hawk and osprey if either species were to nest in or  
14 adjacent to the construction footprint. Refer to the Terrestrial Biology Map Book for a detailed  
15 view of Alternative 1B construction locations.

- 16 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
17 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's  
18 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the  
19 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in  
20 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
21 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
22 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
23 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. The loss is  
24 expected to occur during the first 10 years of Alternative 1B implementation.
- 25 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently  
26 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not  
27 be actively removed but tree mortality would be expected over time as areas became tidally  
28 inundated.
- 29 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
30 seasonally inundated floodplain and riparian restoration actions would remove approximately  
31 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of  
32 temporary loss). These losses would be expected after the first 10 years of Alternative 1B  
33 implementation along the San Joaquin River and other major waterways in CZ 7.
- 34 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
35 enhancement-related activities could disturb Cooper's hawk and osprey nests if they were  
36 present near work sites. A variety of habitat management actions included in CM11 that are  
37 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
38 disturbances that could temporarily remove small amounts of Cooper's hawk and osprey habitat  
39 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,  
40 such as removal of nonnative vegetation and road and other infrastructure maintenance, are  
41 expected to have minor effects on available Cooper's hawk and osprey habitat and are expected  
42 to result in overall improvements to and maintenance of habitat values over the term of the  
43 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
44 and minimized by the AMMs listed below.

1 Permanent and temporary habitat losses from the above conservation measures would  
2 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
3 as riparian habitat within 1 year following completion of construction activities. Although the  
4 effects are considered temporary, the restored riparian habitat would require 1 to several  
5 decades to functionally replace habitat that has been affected and for trees to attain sufficient  
6 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk and*  
7 *White-Tailed Kite* contains actions described below to reduce the effect of temporal loss of  
8 nesting habitat, including the transplanting of mature trees.

- 9 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
10 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
11 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.  
12 Maintenance activities would include vegetation management, levee and structure repair, and  
13 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
14 AMM1–AMM7 and conservation actions as described below.
- 15 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
16 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan  
17 Area, because they would be expected to avoid contact with construction and other equipment.  
18 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,  
19 including equipment operation, noise and visual disturbances could affect nests or lead to their  
20 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
21 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
22 be available to address these adverse effects on Cooper's hawk and osprey.

23 The following paragraphs summarize the combined effects discussed above and describe other  
24 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
25 included.

### 26 ***Near-Term Timeframe***

27 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
28 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
29 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
30 effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338  
31 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting habitat  
32 in the study area in the near-term. These effects would result from the construction of the water  
33 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*  
34 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
35 *Inundated Floodplain Restoration*—400 acres of habitat).

36 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
37 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.  
38 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49  
39 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and osprey  
40 habitat. In addition, The near-term effects of other conservation actions would remove 400 acres of  
41 modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of  
42 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

43 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
44 valley/foothill riparian natural community (Table 3-4 in Chapter 3). These conservation actions are

1 associated with CM3, and CM7 and would occur in the same timeframe as the construction and early  
2 restoration losses. The majority of riparian protection and restoration acres would occur in CZ 7 as  
3 part of a reserve system with extensive wide bands or large patches of valley/foothill riparian  
4 natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*).  
5 Riparian restoration would expand the patches of existing riparian forest in order to support nesting  
6 habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk and osprey by  
7 protecting small but essential habitats that occur within cultivated lands, such as tree rows along  
8 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective  
9 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by  
10 planting and maintaining native trees along roadsides and field borders within protected cultivated  
11 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

12 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
13 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
14 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
15 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
16 would require one to several decades to functionally replace habitat that has been affected and for  
17 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
18 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
19 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
20 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
21 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
22 habitat could further reduce this limited resource and reduce or restrict the number of active nests  
23 within the study area until restored riparian habitat is sufficiently developed.

24 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
25 trees, including transplanting trees scheduled for removal. These would be supplemented with  
26 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
27 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
28 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
29 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
30 term period. A variety of native tree species would be planted to provide trees with differing growth  
31 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
32 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
33 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
34 trees that were incorporated into the riparian restoration would not be clustered in a single region  
35 of the study area, but would be distributed throughout the conserved lands.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
41 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
42 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
43 osprey are not species that are covered under the BDCP. For the BDCP to avoid having an adverse  
44 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
45 ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
2 address this adverse effect.

### 3 **Late Long-Term Timeframe**

4 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
5 and osprey. Alternative 1B as a whole would result in the permanent loss of and temporary effects  
6 on 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

7 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
8 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
9 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
10 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and  
11 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
12 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
13 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
14 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
15 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within  
16 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
17 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
18 potential nest trees would be increased by planting and maintaining native trees along roadsides  
19 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
20 SWHA2.1).

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
26 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
27 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
28 osprey are not species that are covered under the BDCP. For the BDCP to avoid having an adverse  
29 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
30 ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
31 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
32 address this adverse effect.

33 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential for direct mortality of  
34 these special-status species under Alternative 1B would represent an adverse effect in the absence  
35 of other conservation actions. However, with habitat protection and restoration associated with  
36 CM3, CM5, CM7, guided by biological goals and objectives and by AMM1–AMM7 and *AMM18*  
37 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
38 the effects of habitat loss on Cooper's hawk and osprey under Alternative 1B would not be adverse.  
39 Cooper's hawk and osprey are not covered species under the BDCP. For the BDCP to avoid an  
40 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
41 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be  
42 available to address this adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
6 effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338  
7 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting habitat  
8 in the study area in the near-term. These effects would result from the construction of the water  
9 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (CM2 *Yolo*  
10 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
11 *Inundated Floodplain Restoration*—400 acres of habitat).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
13 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.  
14 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49  
15 acres should be protected to mitigate the CM1 losses of modeled Cooper's hawk and osprey habitat.  
16 In addition, The near-term effects of other conservation actions would remove 400 acres of modeled  
17 breeding habitat, and therefore require 400 acres of restoration and 400 acres of protection of  
18 modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios. The BDCP has  
19 committed to near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill  
20 riparian natural community (Table 3-4 in Chapter 3). These conservation actions are associated  
21 with CM3, and CM7 and would occur in the same timeframe as the construction and early  
22 restoration losses. The majority of riparian protection and restoration acres would occur in CZ 7 as  
23 part of a reserve system with extensive wide bands or large patches of valley/foothill riparian  
24 natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*).  
25 Riparian restoration would expand the patches of existing riparian forest in order to support nesting  
26 habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk and osprey by  
27 protecting small but essential habitats that occur within cultivated lands, such as tree rows along  
28 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective  
29 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by  
30 planting and maintaining native trees along roadsides and field borders within protected cultivated  
31 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
34 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
35 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
36 would require one to several decades to functionally replace habitat that has been affected and for  
37 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
38 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
39 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
40 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
41 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
42 habitat would further reduce this limited resource and could reduce or restrict the number of active  
43 nests within the study area until restored riparian habitat is sufficiently developed.

1 *AMM18 Swainson's hawk and White-Tailed Kite* would implement a program to plant large mature  
2 trees, including transplanting trees scheduled for removal. These would be supplemented with  
3 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
4 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
5 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
6 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
7 term period. A variety of native tree species would be planted to provide trees with differing growth  
8 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
9 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
10 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
11 trees that were incorporated into the riparian restoration would not be clustered in a single region  
12 of the study area, but would be distributed throughout the conserved lands.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
14 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
15 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
16 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
18 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
19 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Cooper's hawk and*  
20 *osprey are not species that are covered under the BDCP. For the BDCP to avoid having a significant*  
21 *impact on individuals, preconstruction surveys for noncovered avian species would be required to*  
22 *ensure that active nests are detected and avoided. Implementation of Mitigation Measure BIO-75*  
23 *would reduce the potential impact on nesting Cooper's hawk and osprey to a less-than-significant*  
24 *level.*

### 25 **Late Long-Term Timeframe**

26 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
27 and osprey. Alternative 1B as a whole would result in the permanent loss of and temporary effects  
28 on 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

29 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
30 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*  
31 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
32 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and  
33 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
34 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
35 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
36 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
37 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within  
38 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
39 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
40 potential nest trees would be increased by planting and maintaining native trees along roadsides  
41 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
42 SWHA2.1).

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
4 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
5 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Cooper's hawk and*  
6 *osprey are not species that are covered under the BDCP. For the BDCP to have a less-than-significant*  
7 *impact on individuals, preconstruction surveys for noncovered avian species would be required to*  
8 *ensure that active nests are detected and avoided. Implementation of Mitigation Measure BIO-75,*  
9 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce*  
10 *this impact to a less-than-significant level.*

11 Considering these protection and restoration provisions, which would provide acreages of new or  
12 enhanced habitat in amounts greater than necessary to compensate for the time lag of restoring  
13 riparian habitats lost to construction and restoration activities, and with implementation of AMM1–  
14 AMM7, AMM18 Swainson's Hawk and White-Tailed Kite, and Mitigation Measure BIO-75, the loss of  
15 habitat or direct mortality through implementation of Alternative 1B would not result in a  
16 substantial adverse effect through habitat modifications and would not substantially reduce the  
17 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
18 under this alternative would have a less-than-significant impact on Cooper's hawk and osprey.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
20 **Disturbance of Nesting Birds**

21 See Mitigation Measure BIO-75 under Impact BIO-75.

22 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**  
23 **Transmission Facilities**

24 New transmission lines would increase the risk for bird-power line strikes, which could result in  
25 injury or mortality of Cooper's hawk and osprey. The existing network of transmission lines in the  
26 Plan Area currently poses the same small risk for Cooper's hawk and osprey, and any incremental  
27 risk associated with the new power line corridors would also be expected to be low. AMM20 Greater  
28 Sandhill Crane, which would install flight-diverters on new and selected existing transmission lines  
29 would further reduce any adverse effects.

30 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
31 could result in injury or mortality of Cooper's hawk and osprey. With the implementation of AMM20  
32 Greater Sandhill Crane, which would install flight-diverters on new and selected existing  
33 transmission lines, there would not be an adverse effect on Cooper's hawk and osprey.

34 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
35 could result in injury or mortality of Cooper's hawk and osprey. AMM20 Greater Sandhill Crane,  
36 which would install flight-diverters on new and selected existing transmission lines, would  
37 minimize this risk would reduce the impact of new transmission lines on Cooper's hawk and osprey  
38 to a less-than-significant level.

39 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

40 **Indirect construction- and operation-related effects:** Construction noise above background noise  
41 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction

1 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
2 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
3 the extent to which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or  
4 osprey were to nest in or adjacent to work areas, construction and subsequent maintenance-related  
5 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce  
6 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*  
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the  
8 potential for adverse effects of construction-related activities on survival and productivity of nesting  
9 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities  
10 construction could cause the accidental release of petroleum or other contaminants that could affect  
11 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or  
12 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.  
13 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would  
14 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from  
15 the construction area and negative effects of dust on active nests.

16 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
17 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under  
18 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
19 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
20 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
21 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
22 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

23 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
24 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
25 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
26 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
27 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
28 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
29 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
30 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via  
31 uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

32 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
33 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
34 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
35 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
36 adaptive management as described in CM12 would be available to address the uncertainty of  
37 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

38 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
39 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,  
40 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
41 could result in ongoing but periodic postconstruction disturbances that could affect Cooper's hawk  
42 and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
43 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse  
44 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
45 communities restoration or floodplain restoration could result in increased exposure of Cooper's



1 hawk or osprey to methylmercury, through the ingestion of fish or small mammals in tidally  
2 restored areas. However, it is currently unknown what concentrations of methylmercury are  
3 harmful to these species and the potential for increased exposure varies substantially within the  
4 study area. Site-specific restoration plans that address the creation and mobilization of mercury, as  
5 well as monitoring and adaptive management as described in CM12 would better inform potential  
6 impacts and address the uncertainty of methylmercury levels in restored tidal marsh in the study  
7 area on cooper's hawk and osprey. The site-specific planning phase of marsh restoration would be  
8 the appropriate place to assess the potential for risk of methylmercury exposure for Cooper's hawk  
9 and osprey, once site specific sampling and other information could be developed.

10 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
11 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.  
12 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
13 facilities, could result in ongoing but periodic postconstruction disturbances that could affect  
14 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,  
15 increased dust and sedimentation, and operations and maintenance of the water conveyance  
16 facilities under Alternative 1B would have a less-than-significant impact on Cooper's hawk and  
17 osprey with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
18 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1-AMM7. The implementation of tidal  
19 natural communities restoration or floodplain restoration could result in increased exposure of  
20 Cooper's hawk or osprey to methylmercury through the ingestion of fish or small mammals in  
21 restored tidal areas. However, it is currently unknown what concentrations of methylmercury are  
22 harmful to these species. Site-specific restoration plans that address the creation and mobilization of  
23 mercury, as well as monitoring and adaptive management as described in CM12, would address the  
24 uncertainty of methylmercury levels in restored tidal marsh in the study area and better inform  
25 potential impacts on Cooper's hawk and osprey.

26 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
27 **Disturbance of Nesting Birds**

28 See Mitigation Measure BIO-75 under Impact BIO-75.

29 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**  
30 **as a Result of Implementation of Conservation Components**

31 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
32 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey  
33 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on  
34 breeding habitat because trees in which nest sites are situated already withstand floods, the  
35 increase in inundation frequency and duration is expected to remain within the range of tolerance of  
36 riparian trees, and nest sites are located above floodwaters.

37 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
38 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of  
39 seasonal inundation in existing riparian natural communities is likely to be beneficial for these  
40 species, because, historically, flooding was the main natural disturbance regulating ecological  
41 processes in riparian areas, and flooding promotes the germination and establishment of many  
42 native riparian plants.

1 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
2 sites because trees in which nest sites are situated already withstand floods, the increase in  
3 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
4 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic  
5 inundation resulting from CM2 and CM5 would not have an adverse effect on Cooper's hawk and  
6 osprey.

7 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
8 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
9 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
10 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic  
11 inundation resulting from CM2 and CM5 would have a less-than-significant impact on Cooper's  
12 hawk and osprey.

### 13 **Golden Eagle and Ferruginous Hawk**

14 This section describes the effects of Alternative 1B, including water conveyance facilities  
15 construction and implementation of other conservation components, on golden eagle and  
16 ferruginous hawk. Modeled foraging habitat for these species consists of grassland, alkali seasonal  
17 wetland, vernal pool complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study  
18 area.

19 Construction and restoration associated with Alternative 1B conservation measures would result in  
20 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging  
21 habitat as indicated in Table 12-1B-44. Full implementation of Alternative 1B would include the  
22 following conservation actions over the term of the BDCP that would also benefit golden eagles or  
23 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 24 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
25 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
26 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 27 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 28 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
29 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 30 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
31 VPNC2.5, and GNC2.4, associated with CM11).
- 32 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
33 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 34 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
35 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
36 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

37 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
38 management activities to enhance natural communities for species and implementation of AMM1-  
39 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and  
40 would be less than significant for CEQA purposes.

1 **Table 12-1B-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**  
2 **Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	2,962	2,962	4,528	4,528	NA	NA
<b>Total Impacts CM1</b>		<b>2,962</b>	<b>2,962</b>	<b>4,528</b>	<b>4,528</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	5,450	26,198	376	893	1,158–3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158–3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>8,412</b>	<b>29,160</b>	<b>4,904</b>	<b>5,421</b>	<b>1,158–3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3  
4 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**  
5 **Ferruginous Hawk**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
7 of up to 34,581 acres of modeled foraging habitat for golden eagle and ferruginous hawk (29,160  
8 acres of permanent loss and 5,421 acres of temporary loss; Table 12-1B-44). Conservation measures  
9 that would result in these losses are conveyance facilities and transmission line construction, and  
10 establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2),  
11 tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland  
12 restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10),  
13 and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres)  
14 would result from CM4. Habitat enhancement and management activities (CM11), which include  
15 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,  
16 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities  
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
18 facilities could degrade or eliminate golden eagle foraging habitat. Each of these individual activities  
19 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
20 conclusion follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would  
22 result in the combined permanent and temporary loss of up to 7,490 acres of modeled golden  
23 eagle and ferruginous hawk foraging habitat (2,962 acres of permanent loss, 4,528 acres of  
24 temporary loss) from CZ 4, CZ 5, CZ 6, CZ 7, and CZ 8. The permanent and temporary losses  
25 would occur at various locations along the new canal route from the transmission line footprint,  
26 the construction of the canal and the associated borrow and spoil sites and at the intake sites

1 along the Sacramento River. Permanent and temporary losses of foraging habitat would also  
2 occur at the new forebay site just south of Clifton Court Forebay and associated borrow and  
3 spoil sites. The CM1 construction footprint does not overlap with any occurrences of golden  
4 eagle or ferruginous hawk. However, some of the grassland habitat lost in CZ 8 is composed of  
5 larger stands of ruderal and herbaceous vegetation and California annual grassland, which  
6 provides high-value foraging habitat for these species. There are no Refer to the Terrestrial  
7 Biology Map Book for a detailed view of Alternative 1B construction locations.

- 8 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
9 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
10 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of  
11 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
12 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
13 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
14 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
15 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
16 years of Alternative 1B implementation.
- 17 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation  
18 and inundation would permanently remove an estimated 20,880 acres of modeled golden eagle  
19 and ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in  
20 CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on  
21 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
22 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact  
23 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in  
24 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex  
25 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of  
26 Suisun Marsh.
- 27 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
28 seasonally inundated floodplain would permanently and temporarily remove approximately  
29 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,  
30 517 temporary). These losses would be expected after the first 10 years of Alternative 1B  
31 implementation along the San Joaquin River and other major waterways in CZ 7.
- 32 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
33 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
34 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
35 would be restored after the construction periods. Grassland restoration would be implemented  
36 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk  
37 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 38 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would  
39 result in the permanent removal of 705 acres of golden eagle and ferruginous hawk foraging  
40 habitat.
- 41 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
42 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
43 habitats could result in localized ground disturbances that could temporarily remove small  
44 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,  
45 such as removal of nonnative vegetation and road and other infrastructure maintenance

1 activities, would be expected to have minor adverse effects on available habitat for these  
2 species. CM11 would also include the construction of recreational-related facilities including  
3 trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*  
4 *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,  
5 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.  
6 However, approximately 50 acres of grassland habitat would be lost from the construction of  
7 trails and facilities.

- 8 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
9 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and  
10 longfin smelt conservation hatchery in CZ 1.
- 11 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.  
14 Maintenance activities would include vegetation management, levee and structure repair, and  
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
16 AMM1–AMM7 and conservation actions as described below.
- 17 ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
18 golden eagle and ferruginous hawk because foraging individuals would be expected to  
19 temporarily avoid the increased noise and activity associated with construction areas.

20 The following paragraphs summarize the combined effects discussed above and describe other  
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
22 included.

### 23 ***Near-Term Timeframe***

24 Because the water conveyance facility construction is being evaluated at the project level, the near-  
25 term BDCP conservation strategy has been evaluated to determine whether it would provide  
26 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
27 such conveyance facility construction would not be adverse under NEPA. The Plan would remove  
28 13,316 acres (8,412 permanent, 4,904 temporary) of modeled golden eagle and ferruginous hawk  
29 foraging habitat in the study area in the near-term. These effects would result from the construction  
30 of the water conveyance facilities (CM1, 7,490 acres), and implementing other conservation  
31 measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7*  
32 *Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal*  
33 *Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*  
34 *Management and CM18 Conservation Hatcheries—5,826 acres).*

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
36 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be  
37 protected to compensate for the CM1 losses of 7,490 acres of golden eagle and ferruginous hawk  
38 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
39 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
40 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

41 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
42 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
43 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
2 in the same timeframe as the construction and early restoration losses thereby avoiding adverse  
3 effects of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland  
4 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2)  
5 Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal  
6 wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
7 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand golden  
8 eagle and ferruginous hawk foraging habitat and reduce the effects of current levels of habitat  
9 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and  
10 mammal prey populations would be increased on protected lands, enhancing the foraging value of  
11 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would  
12 be increased on protected natural communities by encouraging ground squirrel occupancy and  
13 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
14 squirrel control programs (i.e., poisoning).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
16 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk  
17 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time  
18 period would be in alfalfa and pasture crop types (very high- and high-value crop types for  
19 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.  
20 This biological objective provides an estimate for the high proportion of cultivated lands protected  
21 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

22 The acres of restoration and protection contained in the near-term Plan goals and the additional  
23 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
24 level effects of CM1 on golden eagle and ferruginous hawk. However, the conservation commitment  
25 is 7,572 acres short of meeting the compensation for other near-term effects on golden eagle and  
26 ferruginous hawk habitat. Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden  
27 Eagle and Ferruginous Hawk Foraging Habitat* would be available to address the adverse effect of  
28 near-term habitat loss.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2  
30 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention  
31 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and  
32 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
33 Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
34 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
35 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 36 **Late Long-Term Timeframe**

37 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled  
38 foraging habitat for golden eagle and ferruginous hawk. Alternative 1B as a whole would result in  
39 the permanent loss of and temporary effects on 34,631 acres of modeled foraging habitat during the  
40 term of the Plan (13% of the modeled habitat in the study area). The locations of these losses are  
41 described above in the analyses of individual conservation measures.

42 The Plan includes conservation commitments through *CM3 Natural Communities Protection and  
43 Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal  
44 Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural

1 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
2 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
3 species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration and protection  
4 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in  
5 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes  
6 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali  
7 seasonal wetland, and vernal pool natural communities which would expand foraging habitat for  
8 golden eagle and ferruginous hawk and reduce the effects of current levels of habitat fragmentation.  
9 Under *CM11 Natural Communities Enhancement and Management*, insect and small mammal prey  
10 populations would be increased on protected lands, enhancing the foraging value of these natural  
11 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased  
12 on protected natural communities by encouraging ground squirrel occupancy and expansion  
13 through the creation of berms, mounds, edges, and through the prohibition of ground squirrel  
14 control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and other native  
15 wildlife species would provide approximately 15,400 acres of potential habitat for golden eagle and  
16 ferruginous hawk (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected  
17 would be in alfalfa and pasture crop types (very high- and high-value crop types for Swainson's  
18 hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

26 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential for mortality of  
27 this special-status species under Alternative 1B would represent an adverse effect in the absence of  
28 other conservation actions. However, with habitat protection and restoration associated with CM3,  
29 CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would  
30 be in place throughout the construction period, and Mitigation Measure BIO-113, *Compensate for the*  
31 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the effects of habitat loss  
32 and potential direct mortality on golden eagle and ferruginous hawk under Alternative 1B would not  
33 be adverse.

#### 34 **CEQA Conclusion:**

#### 35 **Near-Term Timeframe**

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
38 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
39 effects of construction would be less than significant under CEQA. The Plan would remove 13,316  
40 acres (8,412 permanent, 4,904 temporary) of modeled golden eagle and ferruginous hawk foraging  
41 habitat in the study area in the near-term. These effects would result from the construction of the  
42 water conveyance facilities (CM1, 7,490 acres), and implementing other conservation measures  
43 (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian*  
44 *Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and*

1 *Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*  
2 *Management and CM18 Conservation Hatcheries—5,826 acres).*

3 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
4 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be  
5 protected to compensate for the CM1 losses of 7,490 acres of golden eagle and ferruginous hawk  
6 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
7 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
8 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

9 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
11 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
12 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
13 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
14 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland  
15 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and  
16 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali  
17 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
18 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
19 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels  
20 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect  
21 and mammal prey populations would be increased on protected lands, enhancing the foraging value  
22 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability  
23 would be increased on protected natural communities by encouraging ground squirrel occupancy  
24 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
25 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and  
26 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat  
27 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands  
28 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-  
29 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden  
30 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of  
31 cultivated lands protected in the near-term time period which would be suitable for golden eagle  
32 and ferruginous hawk.

33 The acres of restoration and protection contained in the near-term Plan goals and the additional  
34 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
35 level effects of CM1 on golden eagle and ferruginous hawk. However, the conservation commitment  
36 is 7,572 acres short of meeting the compensation for other near-term effects on golden eagle and  
37 ferruginous hawk habitat. The implementation of Mitigation Measure BIO-113, *Compensate for the*  
38 *Near-Term Loss of Golden Eagle and Ferruginous Habitat*, would reduce the near-term impact of  
39 habitat loss to a less-than-significant level.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
41 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
42 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
43 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
44 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or



1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 3 **Late Long-Term Timeframe**

4 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled  
5 foraging habitat for golden eagle and ferruginous hawk. Alternative 1B as a whole would result in  
6 the permanent loss of and temporary effects on 34,631 acres of modeled foraging habitat during the  
7 term of the Plan (13% of the modeled habitat in the study area). The locations of these losses are  
8 described above in the analyses of individual conservation measures.

9 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
10 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
11 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
12 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
13 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
14 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
15 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be  
16 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
17 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
18 pool natural communities which would expand foraging habitat for golden eagle and ferruginous  
19 hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*  
20 *Communities Enhancement and Management*, insect and small mammal prey populations would be  
21 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
22 ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural  
23 communities by encouraging ground squirrel occupancy and expansion through the creation of  
24 berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
25 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would  
26 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk  
27 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
28 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk  
29 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
35 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
36 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

37 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
38 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
39 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
40 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*  
41 *Hawk Foraging Habitat*, the loss of habitat or direct mortality through implementation of Alternative  
42 1B would not result in a substantial adverse effect through habitat modifications and would not  
43 substantially reduce the number or restrict the range of either species. Therefore, the loss of habitat

1 or potential mortality under this alternative would have a less-than-significant impact on golden  
2 eagle and ferruginous hawk.

3 **Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and**  
4 **Ferruginous Hawk Foraging Habitat**

5 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
6 crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the  
7 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
8 2:1. Additional grassland protection, enhancement, and management may be substituted for the  
9 protection of high-value cultivated lands.

10 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical**  
11 **Transmission Facilities**

12 New transmission lines would increase the risk that golden eagles and ferruginous hawks could be  
13 subject to power line strikes, which could result in injury or mortality of these species. Golden eagle  
14 and ferruginous hawk would be at low risk of bird strike mortality based on factors assessed in the  
15 bird strike vulnerability analysis (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
16 *Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new transmission  
17 lines and the flight behavior of species. The existing network of transmission lines in the Plan Area  
18 currently poses the same small risk for golden eagle and ferruginous hawk, and any incremental risk  
19 associated with the new power line corridors would also be expected to be low. *AMM20 Greater*  
20 *Sandhill Crane*, would further reduce any adverse effects.

21 **NEPA Effects:** New transmission lines would minimally increase the risk for golden eagle and  
22 ferruginous hawk power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
23 potential effect of the construction of new transmission lines on golden eagle and ferruginous hawk  
24 would not be adverse.

25 **CEQA Conclusion:** New transmission lines would minimally increase the risk for golden eagle and  
26 ferruginous hawk power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
27 impact of the construction of new transmission lines on golden eagle and ferruginous hawk to a less-  
28 than-significant level.

29 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**  
30 **Hawk**

31 **Indirect construction- and operation-related effects:** Construction- and subsequent  
32 maintenance-related noise and visual disturbances could disrupt foraging, and reduce the functions  
33 of suitable foraging habitat for golden eagle and ferruginous hawk. Construction noise above  
34 background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of  
35 construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
36 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to  
37 determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.  
38 Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
39 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical  
40 equipment during water conveyance facilities construction could cause the accidental release of  
41 petroleum or other contaminants that could affect these species or their prey in the surrounding  
42 habitat. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,

1 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment  
2 or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a  
3 negative effect on the species. However, AMM1–AMM7 would also ensure that measures would be in  
4 place to prevent runoff from the construction area and the negative effects of dust on wildlife  
5 adjacent to work areas.

6 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 1B  
7 implementation could have adverse effects on these species through the modification of habitat.  
8 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1B  
9 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

10 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative  
11 1B implementation could have a significant impact on the species from modification of habitat. With  
12 the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1B  
13 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

#### 14 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk** 15 **Habitat as a Result of Implementation of Conservation Components**

16 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
17 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
18 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-1B-44).

19 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
20 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled  
21 habitat (Table 12-1B-44).

22 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and  
23 increased frequency and duration of inundation of grassland habitats may affect prey populations  
24 that have insufficient time to recover following inundation events. However, periodically inundated  
25 habitat would not be expected to have an adverse effect on local or migratory golden eagles or the  
26 wintering ferruginous hawk populations in the study area.

27 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on  
28 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In  
29 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of  
30 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on  
31 the wintering golden eagle or ferruginous hawk populations in the study area.

32 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation  
33 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging  
34 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823  
35 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-  
36 significant impact on the golden eagle and ferruginous hawk populations in the study area.

#### 37 **Cormorants, Herons and Egrets**

38 This section describes the effects of Alternative 1B, including water conveyance facilities  
39 construction and implementation of other conservation components, on double-crested cormorant,  
40 great blue heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding  
41 habitat for these species consists of valley/foothill riparian forest.

1 Construction and restoration associated with Alternative 1B conservation measures would result in  
2 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated  
3 in Table 12-1B-45. The majority of the losses would take place over an extended period of time as  
4 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would  
5 be initiated in the same timeframe as the losses, it could take one or more decades for restored  
6 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of  
7 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk and*  
8 *White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
9 implementation of Alternative 1B would include the following conservation actions over the term of  
10 the BDCP which would also benefit cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3,  
11 *Biological Goals and Objectives*).

- 12 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
13 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
14 associated with CM7).
- 15 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
16 10 (Objective VFRNC1.2, associated with CM3).
- 17 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
18 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
19 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
20 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
22 management activities to enhance natural communities for species and implementation of AMM1-  
23 AMM7, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75, impacts on  
24 cormorants, herons, and egrets would not be adverse for NEPA purposes and would be less than  
25 significant for CEQA purposes.

1 **Table 12-1B-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**  
2 **Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting (Rookeries)	51	51	39	39	NA	NA
<b>Total Impacts CM1</b>		<b>51</b>	<b>51</b>	<b>39</b>	<b>39</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting (Rookeries)	387	684	88	123	51-92	266
<b>Total Impacts CM2-CM18</b>		<b>387</b>	<b>684</b>	<b>88</b>	<b>123</b>	<b>51-92</b>	<b>266</b>
<b>TOTAL IMPACTS</b>		<b>438</b>	<b>735</b>	<b>127</b>	<b>162</b>	<b>51-92</b>	<b>266</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**  
5 **Cormorants, Herons and Egrets**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
7 of up to 897 acres of modeled nesting habitat (735 acres of permanent loss and 162 acres of  
8 temporary loss) for double-crested cormorant, great blue heron, great egret, snowy egret, and black-  
9 crowned night heron (Table 12-1B-45). Conservation measures that would result in these losses are  
10 conveyance facilities and transmission line construction, and establishment and use of borrow and  
11 spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2), tidal natural  
12 communities restoration (CM4), and seasonally inundated floodplain restoration (CM5). Habitat  
13 enhancement and management activities (CM11), which include ground disturbance or removal of  
14 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
15 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
16 facilities could degrade or eliminate cormorant, heron, and egret modeled habitat. Each of these  
17 individual activities is described below. A summary statement of the combined impacts, NEPA  
18 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B water conveyance facilities  
20 would result in the combined permanent and temporary loss of up to 90 acres of modeled  
21 nesting habitat for cormorants, herons, and egrets (Table 12-1B-45). Of the 90 acres of modeled  
22 habitat that would be removed for the construction of the conveyance facilities, 51 acres would  
23 be a permanent loss and 39 acres would be a temporary loss of habitat. This loss would have the  
24 potential to displace individuals, if present, and remove the functions and value of potentially

1 suitable habitat. The habitat would be removed at multiple locations from the north Delta to the  
2 east Delta and in the vicinity of Clifton Court Forebay. Almost all of the losses would occur on the  
3 borders of waterways. In the north Delta, most of the permanent loss would occur where  
4 Intakes 1–5 encroach on the Sacramento River’s east bank between Freeport and Courtland. The  
5 riparian areas here are very small patches, some dominated by valley oak and others by  
6 nonnative trees and scrub vegetation. In the east Delta, small permanent losses would occur  
7 from canal construction just south of Twin Cities Road and just north of Walnut Grove Road. A  
8 small area of riparian habitat (mostly blackberries) would be permanently removed in the south  
9 Delta at the new forebay construction site. The temporary riparian losses would occur at the  
10 intake sites along the Sacramento River and at temporary siphon work areas where the canal  
11 would cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment  
12 Slough, Railroad Canal, and Middle River just south of Victoria Canal. Tunnel construction at Old  
13 River just south of Victoria Canal would also temporarily remove mixed willows and brambles.  
14 There are no occurrences of least Bell’s vireo or yellow warbler that intersect with the CM1  
15 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B  
16 construction locations.

17 The primary impact of concern regarding double-crested cormorant, great blue heron, great  
18 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and  
19 other large trees associated with known nest sites. There is one great egret rookery that is  
20 currently intersected by a temporary siphon work area associated with CM1. The location of the  
21 rookery is on an inchannel island, north of Union Island and south of the town of Holt. Because  
22 the species is highly traditional in their use of rookeries, the establishment of new nest sites is  
23 unpredictable. Therefore, to avoid adverse effects on great blue herons (and cormorants,  
24 herons, and egrets, should future surveys detect additional rookeries), existing rookeries must  
25 be avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
26 *Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*,  
27 would be available to address this adverse effect on cormorants, herons, and egrets. Refer to the  
28 Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.

- 29 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
30 would result in the combined permanent and temporary loss of up to 177 acres of nesting  
31 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.  
32 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to  
33 improve passage of fish through the bypasses. Most of the riparian losses would occur at the  
34 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to  
35 improve water movement in the Toe Drain and in the Sacramento Weir would also remove  
36 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 1B  
37 implementation.
- 38 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation  
39 and inundation would permanently remove an estimated 552 acres of nesting habitat for  
40 cormorants, herons and egrets. Trees would not be actively removed but tree mortality would  
41 be expected over time as areas became tidally inundated. Depending on the extent and value of  
42 remaining habitat, this could reduce use of these habitats by these species. There is one CNDDB  
43 occurrence of a great blue heron rookery that overlaps with the hypothetical restoration  
44 footprint for tidal restoration. The occurrence is on Decker Island and tidal restoration could  
45 potentially impact the nest trees from inundation. This potential effect would need to be  
46 addressed within the project-specific analysis for tidal restoration projects.

- 1       ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
2       seasonally inundated floodplain would permanently remove approximately 43 acres and  
3       temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting  
4       habitat. These losses would be expected after the first 10 years of Alternative 1B  
5       implementation along the San Joaquin River and other major waterways in CZ 7.
  
- 6       ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
7       enhancement-related activities could disturb cormorant, heron, and egret nests if they were  
8       present near work sites. A variety of habitat management actions included in CM11 that are  
9       designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
10      disturbances that could temporarily remove small amounts of cormorant, heron, and egret  
11      habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing  
12      activities, such as removal of nonnative vegetation and road and other infrastructure  
13      maintenance, are expected to have minor effects on available habitat for these species and are  
14      expected to result in overall improvements to and maintenance of habitat values over the term  
15      of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be  
16      avoided and minimized by the AMMs listed below.
  
- 17      ● Permanent and temporary habitat losses from the above conservation measures would  
18      primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
19      as riparian habitat within 1 year following completion of construction activities. Although the  
20      effects are considered temporary, the restored riparian habitat would require years to several  
21      decades to functionally replace habitat that has been affected and for trees to attain sufficient  
22      size and structure for established rookeries. *AMM18 Swainson's Hawk and White-Tailed Kite*  
23      contains actions described below to reduce the effect of temporal loss of mature riparian  
24      habitat, including the transplanting of mature trees.
  
- 25      ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
26      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
27      disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.  
28      Maintenance activities would include vegetation management, levee and structure repair, and  
29      re-grading of roads and permanent work areas. These effects, however, would be reduced by  
30      AMMs and conservation actions as described below.
  
- 31      ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
32      direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,  
33      snowy egret, and black-crowned night heron if they were present in the Plan Area, because they  
34      would be expected to avoid contact with construction and other equipment. If birds were to nest  
35      in the construction area, construction-related activities, including equipment operation, noise  
36      and visual disturbances could affect nests or lead to their abandonment, potentially resulting in  
37      mortality of eggs and nestlings. Because cormorants, herons and egrets are highly traditional in  
38      their use of nest sites, all disturbance to nesting birds must be avoided or minimized. Mitigation  
39      Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
40      *Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to  
41      address these adverse effects on cormorants, herons, and egrets.

42      The following paragraphs summarize the combined effects discussed above and describe other  
43      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
44      included.

1       **Near-Term Timeframe**

2       Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3       the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4       provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5       effects of construction would not be adverse under NEPA. The Plan would remove 565 acres of  
6       nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects  
7       would result from the construction of the water conveyance facilities (CM1, 90 acres of nesting  
8       habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
9       *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*—  
10      475 acres of nesting habitat).

11      Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
12      CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
13      breeding habitat. Using these ratios would indicate that 90 acres of breeding habitat should be  
14      restored/created and 90 acres should be protected to compensate for the CM1 losses of modeled  
15      cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
16      would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
17      restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
18      same typical NEPA and CEQA ratios.

19      The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
20      system with extensive wide bands or large patches of valley/foothill riparian natural community  
21      (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
22      restoration would expand the patches of existing riparian forest in order to support nesting habitat  
23      for these species. In addition, small but essential nesting habitat associated with cultivated lands  
24      would also be maintained and protected such as isolated trees, tree rows along field borders or  
25      roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

26      The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
27      satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
28      other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
29      riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
30      would require years to several decades to functionally replace habitat that has been affected and for  
31      trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
32      the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
33      herons and egrets in the near-term time period.

34      *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
35      trees, including transplanting trees scheduled for removal. These would be supplemented with  
36      additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
37      The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
38      In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
39      system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
40      term period. A variety of native tree species would be planted to provide trees with differing growth  
41      rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
42      restoration would not be clustered in a single region of the study area, but would be distributed  
43      throughout protected lands.



1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Double-crested*  
8 *cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not*  
9 *species that are covered under the BDCP. For the BDCP avoid having an adverse effect on*  
10 *individuals, existing nests and rookeries would have to be avoided. Mitigation Measure BIO-75,*  
11 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would be*  
12 *available to address adverse effects on nesting cormorants, herons, and egrets.*

### 13 **Late Long-Term Timeframe**

14 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
15 habitat for cormorants, herons, and egrets. Alternative 1B as a whole would result in the permanent  
16 loss of and temporary effects on 897 acres of potential breeding habitat (5% of the potential  
17 breeding habitat in the Plan Area).

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
19 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*  
20 *Restoration to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill*  
21 *riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and*  
22 *restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large*  
23 *patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP*  
24 *Chapter 3, Conservation Strategy). Riparian restoration would expand the patches of existing*  
25 *riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would*  
26 *also benefit cormorants, herons, and egrets by protecting small but essential habitats that occur*  
27 *within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in*  
28 *farmyards or rural residences(Objective CLNC1.3). In addition, the distribution and abundance of*  
29 *potential nest trees would be increased by planting and maintaining native trees along roadsides*  
30 *and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective*  
31 *SWHA2.1).*

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
33 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
34 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
37 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
38 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Double-crested*  
39 *cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not*  
40 *species that are covered under the BDCP. These species are highly traditional in their use of nest*  
41 *sites, and for the BDCP to avoid having an adverse effect on individuals, preconstruction surveys*  
42 *would be required to ensure that nests are detected and any direct and indirect impacts on*  
43 *rookeries are avoided. Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and*  
44 *Avoid Disturbance of Nesting Birds, and Mitigation Measure BIO-117, Avoid Impacts on Rookeries,*  
45 *would be available to address adverse effects on nesting cormorants, herons, and egrets.*

1 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential for direct mortality of  
2 these special-status species under Alternative 1B would represent an adverse effect in the absence  
3 of other conservation actions. However, with habitat protection and restoration associated with  
4 CM3, CM5, CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–  
5 AMM7 and AMM18 *Swainson’s Hawk and White-Tailed Kite*, which would be in place throughout the  
6 construction period, the effects of habitat loss on cormorants, herons, and egrets under Alternative  
7 1B would not be adverse. Double-crested cormorant, great blue heron, great egret, snowy egret, and  
8 black-crowned night heron are not species that are covered under the BDCP. For the BDCP to avoid  
9 effects on these species, preconstruction surveys for noncovered species would be necessary to  
10 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
11 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
12 *Impacts on Rookeries*, would be available to address adverse effects on nesting cormorants, herons,  
13 and egrets.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
19 effects of construction would be less than significant under NEPA. The Plan would remove 565 acres  
20 of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These  
21 effects would result from the construction of the water conveyance facilities (CM1, 90 acres of  
22 nesting habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*  
23 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*  
24 *Restoration*—475 acres of nesting habitat).

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
26 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
27 breeding habitat. Using these ratios would indicate that 90 acres of breeding habitat should be  
28 restored/created and 90 acres should be protected to compensate for the CM1 losses of modeled  
29 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
30 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
31 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
32 same typical NEPA and CEQA ratios.

33 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
34 system with extensive wide bands or large patches of valley/foothill riparian natural community  
35 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
36 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
37 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
38 would also be maintained and protected such as isolated trees, tree rows along field borders or  
39 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

40 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
41 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
42 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
43 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
44 would require years to several decades to functionally replace habitat that has been affected and for

1 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
2 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
3 herons and egrets in the near-term time period.

4 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
5 trees, including transplanting trees scheduled for removal. These would be supplemented with  
6 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
7 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
8 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
9 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
10 term period. A variety of native tree species would be planted to provide trees with differing growth  
11 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
12 restoration would not be clustered in a single region of the study area, but would be distributed  
13 throughout protected lands.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
19 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
20 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
21 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
22 species that are covered under the BDCP. For the BDCP to avoid an adverse effect on individuals,  
23 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
24 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
25 *Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-significant  
26 level.

### 27 ***Late Long-Term Timeframe***

28 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
29 habitat for cormorants, herons, and egrets. Alternative 1B as a whole would result in the permanent  
30 loss of and temporary effects on 897 acres of potential breeding habitat (5% of the potential  
31 breeding habitat in the Plan Area).

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
33 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
34 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
35 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and  
36 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
37 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
38 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
39 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
40 also benefit cormorants, herons, and egrets by protecting small but essential habitats that occur  
41 within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
42 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
43 potential nest trees would be increased by planting and maintaining native trees along roadsides

1 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
2 SWHA2.1).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
10 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
11 species that are covered under the BDCP. These species are highly traditional in their use of nest  
12 sites, and for the BDCP to avoid a significant impact on individuals, preconstruction surveys would  
13 be required to ensure that nests are detected and any direct and indirect impacts on rookeries are  
14 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
15 *Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would  
16 reduce this potential impact to a less-than-significant level.

17 Considering these protection and restoration provisions, which would provide acreages of new or  
18 enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost to  
19 construction and restoration activities, and with implementation of *AMM1–AMM7*, *AMM18*  
20 *Swainson's Hawk and White-Tailed Kite*, and Mitigation Measures BIO-75 and BIO-117, the loss of  
21 habitat or direct mortality through implementation of Alternative 1B would not result in a  
22 substantial adverse effect through habitat modifications and would not substantially reduce the  
23 number or restrict the range of these species. Therefore, the loss of habitat or potential mortality  
24 under this alternative would have a less-than-significant impact on cormorants, herons, and egrets.

25 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
26 **Disturbance of Nesting Birds**

27 See Mitigation Measure BIO-75 under Impact BIO-75.

28 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

29 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);  
30 therefore, DWR will avoid all direct and indirect impacts on rookeries.

31 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**  
32 **Herons and Egrets**

33 New transmission lines would increase the risk for bird-power line strikes, which could result in  
34 injury or mortality of cormorants, herons and egrets. *AMM20 Greater Sandhill Crane* would minimize  
35 the risk for bird-power line strikes, for these species. This measure would ensure that conductor and  
36 ground lines are fitted with flight diverters in compliance with the best available practices, such as  
37 those specified in the USFWS Avian Protection Guidelines and would minimize the potential for an  
38 adverse effect.

39 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
40 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*  
41 would reduce the potential for collisions on new and select existing powerlines in the study area.

1 The construction of new transmission lines would not result in an adverse effect on cormorants,  
2 herons, and egrets.

3 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
4 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*  
5 would reduce birdstrike on new transmission lines and select existing transmission lines with the  
6 installation of flight diverters. With these in place, new transmission lines would have a less-than-  
7 significant impact on cormorants, herons and egrets.

#### 8 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

9 **Indirect construction- and operation-related effects:** Construction noise above background noise  
10 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
11 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
12 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
13 the extent to which these noise levels could affect cormorants, herons, or egrets. If cormorants,  
14 herons or egrets were to nest in or adjacent to work areas, construction and subsequent  
15 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
16 behaviors, and reduce the functions of suitable nesting habitat for these species. Mitigation Measure  
17 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
18 avoid the potential for adverse effects of construction-related activities on survival and productivity  
19 of nesting cormorants, herons or egrets. The use of mechanical equipment during water conveyance  
20 facilities construction could cause the accidental release of petroleum or other contaminants that  
21 could affect cormorants, herons or egrets in the surrounding habitat. The inadvertent discharge of  
22 sediment or excessive dust adjacent to suitable habitat could also have an adverse effect on these  
23 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,  
24 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
25 from the construction area and negative effects of dust on active nests.

26 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
27 mercury in avian species, including cormorants, herons or egrets. Future operational impacts under  
28 *CM1* were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
29 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
30 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
31 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
32 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

33 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
34 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
35 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
36 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
37 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
38 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
39 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
40 natural community and floodplain restoration could indirectly effect on cormorants, herons or  
41 egrets, via uptake in lower tropic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

42 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
43 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
44 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific

1 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
2 adaptive management as described in CM12 would be available to address the uncertainty of  
3 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or  
4 egrets.

5 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
6 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
7 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
8 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
9 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
10 classes within a species. In addition, the effect of selenium on a species can be confounded by  
11 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
12 2009).

13 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
14 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
15 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
16 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
17 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
18 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
19 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
20 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
21 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
22 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
23 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
24 levels of selenium have a higher risk of selenium toxicity.

25 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
26 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
27 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.  
28 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
29 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
30 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
31 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
32 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
33 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
34 long-term increases in selenium concentrations in water in the Delta under any alternative.  
35 However, it is difficult to determine whether the effects of potential increases in selenium  
36 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
37 lead to adverse effects on cormorants, herons, and egrets.

38 Because of the uncertainty that exists at this programmatic level of review, there could be a  
39 substantial effect on cormorants, herons, and egrets from increases in selenium associated with  
40 restoration activities. This effect would be addressed through the implementation of *AMM27*  
41 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
42 provide specific tidal habitat restoration design elements to reduce the potential for  
43 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
44 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
45 evaluated separately for each restoration effort as part of design and implementation. This

1 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
2 design schedule.

3 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
4 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,  
5 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
6 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,  
7 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
8 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
9 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in  
10 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of  
11 cormorants, herons, and egrets to selenium. This effect would be addressed through the  
12 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
13 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
14 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
15 floodplain restoration could result in increased exposure of cormorants, herons or egrets to  
16 methylmercury through the ingestion of fish in restored tidal areas. However, it is unknown what  
17 concentrations of methylmercury are harmful to these species and the potential for increased  
18 exposure varies substantially within the study area. Site-specific restoration plans that address the  
19 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
20 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
21 area and better inform potential impacts on cormorants, herons, and egrets. The site-specific  
22 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
23 of methylmercury exposure for cormorants, herons, and egrets once site specific sampling and other  
24 information could be developed.

25 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
26 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
27 than significant with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
28 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, Mitigation Measure BIO-117, *Avoid*  
29 *Impacts on Rookeries*, and AMM1–AMM7. The implementation of tidal natural communities  
30 restoration or floodplain restoration could result in increased exposure of cormorants, herons or  
31 egrets to methylmercury, through the ingestion of fish in tidally restored areas. However, it is  
32 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
33 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
34 adaptive management as described in CM12 would address the potential impacts of methylmercury  
35 levels in restored tidal marsh in the study area on cormorants, herons, and egrets. Tidal habitat  
36 restoration could result in increased exposure of cormorants, herons, and egrets to selenium. This  
37 effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
38 would provide specific tidal habitat restoration design elements to reduce the potential for  
39 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
40 Alternative 1B implementation would not have an adverse effect on cormorants, herons, and egrets.

41 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
42 **Disturbance of Nesting Birds**

43 See Mitigation Measure BIO-75 under Impact BIO-75.

1           **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

2           Hérons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);  
3           therefore, DWR will avoid all direct and indirect impacts on rookeries.

4           **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**  
5           **of Implementation of Conservation Components**

6           Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
7           duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,  
8           herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect  
9           on breeding habitat because trees in which nest sites are situated already withstand floods, the  
10          increase in inundation frequency and duration is expected to remain within the range of tolerance of  
11          riparian trees, and nest sites are located above floodwaters.

12          Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
13          inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall  
14          effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for  
15          these species, because, historically, flooding was the main natural disturbance regulating ecological  
16          processes in riparian areas, and flooding promotes the germination and establishment of many  
17          native riparian plants.

18          **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
19          sites because trees in which nest sites are situated already withstand floods, the increase in  
20          inundation frequency and duration is expected to remain within the range of tolerance of riparian  
21          trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation  
22          from CM2 and CM5 would not result in an adverse effect on cormorants, herons and egrets.

23          **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
24          nest sites because trees in which nest sites are situated already withstand floods, the increase in  
25          inundation frequency and duration is expected to remain within the range of tolerance of riparian  
26          trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation  
27          from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and egrets.

28          **Short-Eared Owl and Northern Harrier**

29          This section describes the effects of Alternative 1B, including water conveyance facilities  
30          construction and implementation of other conservation components, on short-eared owl and  
31          northern harrier. Modeled habitat for short-eared owl and northern harrier include tidal brackish  
32          and freshwater emergent wetland, nontidal freshwater perennial emergent wetland, managed  
33          wetland, other natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex,  
34          and selected cultivated lands.

35          Construction and restoration associated with Alternative 1B conservation measures would result in  
36          both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier  
37          as indicated in Table 12-1B-46. Full implementation of Alternative 1B would include the following  
38          conservation actions over the term of the BDCP which would also benefit short-eared owl and  
39          northern harrier (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).



- 1 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
2 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
3 with CM4).
- 4 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,  
5 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 6 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
7 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
8 associated with CM10).
- 9 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
10 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
11 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 12 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 13 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
14 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with Cm3).
- 15 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
16 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 17 ● Increase prey availability and accessibility for grassland-foraging species (Objectives  
18 ASWNC2.4,VPNC2.5, and GNC2.4, associated with CM11).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
20 management activities that would enhance habitat for these species and implementation of AMM1-  
21 AMM7, *AMM27 Selenium Management* and Mitigation Measures BIO-75 and BIO-121, impacts on  
22 short-eared owl and northern harrier would not be adverse for NEPA purposes and would be less  
23 than significant for CEQA purposes.

1  
2

**Table 12-1B-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting and foraging	3,569	3,569	5,630	5,630	NA	NA
<b>Total Impacts CM1</b>		<b>3,569</b>	<b>3,569</b>	<b>5,630</b>	<b>5,630</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting and foraging	12,281	46,700	471	1,224	2,926-8,060	5,978
<b>Total Impacts CM2-CM18</b>		<b>12,281</b>	<b>46,700</b>	<b>471</b>	<b>1,224</b>	<b>2,926-8,060</b>	<b>5,978</b>
<b>TOTAL IMPACTS</b>		<b>15,850</b>	<b>50,269</b>	<b>6,101</b>	<b>6,854</b>	<b>2,926-8,060</b>	<b>5,978</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**  
5 **and Northern Harrier**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
7 of up to 57,123 acres of modeled habitat for short-eared owl and northern harrier (50,269 acres of  
8 permanent loss and 6,854 acres of temporary loss, Table 12-1B-46). Conservation measures that  
9 would result in these losses are conveyance facilities and transmission line construction, and  
10 establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal  
11 habitat restoration (CM4), floodplain restoration (CM5), grassland restoration (CM8), vernal pool  
12 and wetland restoration (CM9), marsh restoration (CM10), and construction of conservation  
13 hatcheries (CM18). The majority of habitat loss would result from CM4. Habitat enhancement and  
14 management activities (CM11), which include ground disturbance or removal of nonnative  
15 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
17 facilities could degrade or eliminate short-eared owl and northern harrier modeled habitat. Each of  
18 these individual activities is described below. A summary statement of the combined impacts and  
19 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would  
21 result in the combined permanent and temporary loss of up to 2,785 acres of modeled short-  
22 eared owl and northern harrier habitat (2,012 acres of permanent loss, 773 acres of temporary  
23 loss). The majority of habitat removed would consist of grassland and alfalfa fields. Habitat  
24 losses would occur at various locations along the new canal route from the construction of the

1 canal and the associated borrow and spoil sites and at the intake sites along the Sacramento  
2 River. Permanent and temporary losses of foraging habitat would also occur at the new forebay  
3 site just south of Clifton Court Forebay and associated borrow and spoil sites. There are no  
4 occurrences of nesting short-eared owl and northern harrier that overlap with the construction  
5 footprint of CM1. However, northern harrier nests were detected throughout the central Delta  
6 during DHCCP surveys and there is suitable habitat throughout the study area for both species.  
7 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*  
8 *of Nesting Birds* would require preconstruction surveys and the establishment of no-disturbance  
9 buffers and would be available to address potential effects on short-eared owls and northern  
10 harriers if they were to nest in or adjacent to construction activities. The majority of habitat  
11 removed would be grassland and cultivated lands from proposed borrow and spoil sites  
12 adjacent to the canal alignment in CZs 4–8. Refer to the Terrestrial Biology Map Book for a  
13 detailed view of Alternative 1B construction locations.

- 14 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
15 would permanently remove 1,021 acres of modeled short-eared owl and northern harrier  
16 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily  
17 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is  
18 expected to occur during the first 10 years of Alternative 1B implementation.
- 19 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
20 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl  
21 and northern harrier habitat. The majority of the losses would be managed wetlands and  
22 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would  
23 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas  
24 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,  
25 although existing nesting habitat for short-eared owl and northern harrier would be removed,  
26 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by  
27 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known  
28 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River  
29 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for CM4.  
30 However, this is an important breeding area for short-eared owl and if restoration footprints  
31 were changed during the implementation process of BDCP to overlap with this area, the effects  
32 on breeding short-eared owls could likely be adverse. Future NEPA and CEQA analysis would be  
33 conducted for restoration projects under BDCP and if restoration was proposed to occur outside  
34 of the hypothetical footprints used for this programmatic analysis, potential impacts on these  
35 species would be captured in the project-level analysis (Appendix 3B, Section 3.2.5).
- 36 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
37 seasonally inundated floodplain would permanently and temporarily remove approximately  
38 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754  
39 temporary). These losses would be expected to occur along the San Joaquin River and other  
40 major waterways in CZ 7.
- 41 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
42 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal  
43 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 44 ● *CM8 Grassland Natural Community Restoration* Restoration of grassland is expected to be  
45 implemented on agricultural lands and would result in the conversion of 1,066 acres of

1 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland  
2 would provide habitat for short-eared owl and northern harrier.

- 3 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
4 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
5 to enhance wildlife values in restored or protected habitats could result in localized ground  
6 disturbances that could temporarily remove small amounts of modeled habitat. Ground-  
7 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure  
8 maintenance activities, would be expected to have minor adverse effects on available habitat  
9 and would be expected to result in overall improvements to and maintenance of habitat values  
10 over the term of the BDCP.

11 Habitat management- and enhancement-related activities could short-eared owl and northern  
12 harrier nests. If either species were to nest in the vicinity of a worksite, equipment operation  
13 could destroy nests, and noise and visual disturbances could lead to their abandonment,  
14 resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction*  
15 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize  
16 these adverse effects.

- 17 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-  
18 eared owl and northern harrier habitat for the development of a delta and longfin smelt  
19 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan  
20 implementation.
- 21 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
22 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
23 disturbances that could affect short-eared owl and northern harrier use of the surrounding  
24 habitat. Maintenance activities would include vegetation management, levee and structure  
25 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
26 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described  
27 below.
- 28 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
29 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in  
30 the Plan Area, because they would be expected to avoid contact with construction and other  
31 equipment. If either species were to nest in the construction area, construction-related  
32 activities, including equipment operation, noise and visual disturbances could destroy nests or  
33 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
34 75 would be available to minimize these adverse effects.

35 The following paragraphs summarize the combined effects discussed above and describe other  
36 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
37 included.

### 38 ***Near-Term Timeframe***

39 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
40 term BDCP conservation strategy has been evaluated to determine whether it would provide  
41 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
42 construction would not be adverse under NEPA. The Plan would remove 21,951 acres of modeled  
43 habitat (15,850 permanent, 6,101 temporary) for short-eared owl and northern harrier in the study

1 area in the near-term. These effects would result from the construction of the water conveyance  
2 facilities (CM1, 9,199 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
3 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
4 *Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
5 *Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation Hatcheries*—  
6 12,752 acres).

7 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
8 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
9 would indicate that 9,199 acres of habitat should be restored and 9,199 acres should be protected to  
10 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
11 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
12 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
13 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
14 protection).

15 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
16 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
17 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
18 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
19 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
20 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the  
21 construction and early restoration losses.

22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
23 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
24 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
25 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
26 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
27 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
28 protected lands, enhancing the foraging value of these natural communities (Objectives  
29 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
30 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
31 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
32 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
33 reserve system which would provide additional foraging habitat and a source of rodent prey that  
34 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
35 (including upland grassland components) would preserve habitat for short-eared owl and northern  
36 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
37 objective would focus on highly degraded areas in order to provide the greatest possible level of  
38 enhancement benefit to the managed wetland natural community and associated species. Managed  
39 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently  
40 supports a high concentration of nesting short-eared owls on Grizzley Island.

41 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
42 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
43 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
44 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
45 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A

1 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
2 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
3 estimate for the proportion of cultivated lands protected in the near-term time period which would  
4 provide suitable nesting and foraging habitat for short-eared owl and northern harrier.

5 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
6 that would be applied to the project-level effects of CM1 and the effects from other near-term  
7 restoration actions. The acres of restoration in the near-term satisfy the project-level effects of CM1,  
8 but are 1,661 acres short of satisfying the compensation required for other near-term impacts.  
9 Mitigation Measure BIO-121, *Compensate for Loss of Short-Eared Owl and Northern Harrier Nesting*  
10 *Habitat*, would be available to address the adverse effect of near-term habitat loss.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
16 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
17 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

18 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP  
19 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would  
20 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
21 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
22 address this adverse effect.

### 23 ***Late Long-Term Timeframe***

24 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting  
25 and foraging habitat for short-eared owl and northern harrier. Alternative 1B as a whole would  
26 result in the permanent loss of and temporary effects on 57,123 acres of modeled short-eared owl  
27 and northern harrier habitat during the term of the Plan (14% of the modeled habitat in the study  
28 area). The locations of these losses are described above in the analyses of individual conservation  
29 measures.

30 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
31 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*  
32 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
33 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
34 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
35 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
36 Chapter 3).

37 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
38 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
39 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
40 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
41 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
42 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
43 protected lands, enhancing the foraging value of these natural communities (Objectives

1 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
2 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
3 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
4 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
5 reserve system which would provide additional foraging habitat and a source of rodent prey that  
6 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
7 (including upland grassland components) would preserve habitat for short-eared owl and northern  
8 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
9 objective would focus on highly degraded areas in order to provide the greatest possible level of  
10 enhancement benefit to the managed wetland natural community and associated species. Managed  
11 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
12 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
13 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
14 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
15 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
16 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
17 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
18 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
19 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
25 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
26 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Short-eared owl  
27 and northern harrier are not species that are covered under the BDCP. For the BDCP to avoid having  
28 an adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
29 required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
30 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
31 address this adverse effect.

32 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential for direct  
33 mortality of these special-status species under Alternative 1B would represent an adverse effect in  
34 the absence of other conservation actions. However, with habitat protection and restoration  
35 associated with CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–  
36 AMM7, which would be in place throughout the construction period, the effects of habitat loss from  
37 Alternative 1B would not be adverse under NEPA. Short-eared owl and northern harrier are not  
38 covered species under the BDCP, and preconstruction surveys for noncovered avian species would  
39 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be  
40 available to address the adverse effect of direct mortality on short-eared owl and northern harrier.

#### 41 **CEQA Conclusion:**

#### 42 **Near-Term Timeframe**

43 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
44 term BDCP conservation strategy has been evaluated to determine whether it would provide

1 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
2 construction would be less than significant under CEQA. The Plan would remove 21,951 acres of  
3 modeled habitat (15,850 permanent, 6,101 temporary) for short-eared owl and northern harrier in  
4 the study area in the near-term. These effects would result from the construction of the water  
5 conveyance facilities (CM1, 9,199 acres), and implementing other conservation measures (*CM2 Yolo*  
6 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*  
7 *Inundated Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland*  
8 *Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation*  
9 *Hatcheries*—12,752 acres).

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
11 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
12 would indicate that 9,199 acres of habitat should be restored and 9,199 acres should be protected to  
13 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
14 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
15 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
16 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
17 protection).

18 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
19 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
20 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
21 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
22 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
23 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the  
24 construction and early restoration losses.

25 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
26 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
27 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
28 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
29 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
30 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
31 protected lands, enhancing the foraging value of these natural communities (Objectives  
32 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
33 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
34 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
35 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
36 reserve system which would provide additional foraging habitat and a source of rodent prey that  
37 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
38 (including upland grassland components) would preserve habitat for short-eared owl and northern  
39 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
40 objective would focus on highly degraded areas in order to provide the greatest possible level of  
41 enhancement benefit to the managed wetland natural community and associated species. Managed  
42 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
43 high concentration of nesting short-eared owls on Grizzley Island.

44 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
45 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and



1 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
2 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
3 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
4 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
5 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
6 estimate for the proportion of cultivated lands protected in the near-term time period which would  
7 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These  
8 biological goals and objectives would inform the near-term protection and restoration efforts and  
9 represent performance standards for considering the effectiveness of restoration actions.

10 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
11 that would be applied to the project-level effects of CM1 and the effects from other near-term  
12 restoration actions. The acres of restoration in the near-term satisfy the project-level effects of CM1,  
13 but are 1,661 acres short of satisfying the compensation required for other near-term impacts. The  
14 implementation of Mitigation Measure BIO-121, *Compensate for Loss of Short-Eared Owl and*  
15 *Northern Harrier Nesting Habitat*, would reduce the impact of near-term habitat loss to a less-than-  
16 significant level.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
21 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
22 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
23 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

24 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP  
25 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would  
26 be required to ensure that nests are detected and avoided. The implementation of Mitigation  
27 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
28 *Birds*, would reduce this potential impact to a less-than-significant level.

### 29 ***Late Long-Term Timeframe***

30 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting  
31 and foraging habitat for short-eared owl and northern harrier. Alternative 1B as a whole would  
32 result in the permanent loss of and temporary effects on 57,123 acres of modeled short-eared owl  
33 and northern harrier habitat during the term of the Plan (14% of the modeled habitat in the study  
34 area). The locations of these losses are described above in the analyses of individual conservation  
35 measures.

36 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
37 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*  
38 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
39 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
40 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
41 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
42 Chapter 3).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
5 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
6 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
7 protected lands, enhancing the foraging value of these natural communities (Objectives  
8 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
9 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
10 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
11 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
12 reserve system which would provide additional foraging habitat and a source of rodent prey that  
13 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
14 (including upland grassland components) would preserve habitat for short-eared owl and northern  
15 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
16 objective would focus on highly degraded areas in order to provide the greatest possible level of  
17 enhancement benefit to the managed wetland natural community and associated species. Managed  
18 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
19 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
20 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
21 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
22 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
23 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
24 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
25 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
26 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Short-eared owl  
34 and northern harrier are not species that are covered under the BDCP. For the BDCP to have a less-  
35 than-significant impact on individuals, preconstruction surveys for noncovered avian species would  
36 be required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75,  
37 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
38 reduce the impact to a less-than-significant level.

39 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
40 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
41 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
42 Mitigation Measures BIO-75 and BIO-121, the loss of habitat or direct mortality through  
43 implementation of Alternative 1B would not result in a substantial adverse effect through habitat  
44 modifications and would not substantially reduce the number or restrict the range of either species.  
45 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-  
46 significant impact on short-eared owl and northern harrier.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern**  
5           **Harrier Nesting Habitat**

6           DWR will restore and protect sufficient acres of suitable nesting habitat for short-eared owl and  
7           northern harrier such that the total acres of habitat impacted in the near-term timeframe are  
8           mitigated at a ratio of 1:1. Restored habitat could consist of grassland or managed wetlands.

9           **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**  
10          **Transmission Facilities**

11          New transmission lines would increase the risk that short-eared owl and northern harrier could be  
12          subject to power line strikes, which could result in injury or mortality of these species. Short-eared  
13          owl and northern harrier would be at low risk of bird strike mortality based on factors assessed in  
14          the bird strike vulnerability analysis (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
15          *Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new transmission  
16          lines and the flight behavior of species. The existing network of transmission lines in the Plan Area  
17          currently poses the same small risk for these species, and any incremental risk associated with the  
18          new power line corridors would also be expected to be low. *AMM20 Greater Sandhill Crane* would  
19          further reduce any adverse effects.

20          **NEPA Effects:** New transmission lines would minimally increase the risk for short-eared owl and  
21          northern harrier power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
22          potential effect of the construction of new transmission lines on short-eared owl and northern  
23          harrier would not be adverse.

24          **CEQA Conclusion:** New transmission lines would minimally increase the risk for short-eared owl  
25          and northern harrier power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
26          impact of the construction of new transmission lines on short-eared owl and northern harrier to a  
27          less-than-significant level.

28          **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern**  
29          **Harrier**

30          **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
31          with construction-related activities could result in temporary disturbances that affect short-eared  
32          owl and northern harrier use of modeled habitat. Construction noise above background noise levels  
33          (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
34          (BDCP Appendix 5J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
35          *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
36          which these noise levels could affect short-eared owl or northern harrier. Indirect effects associated  
37          with construction include noise, dust, and visual disturbance caused by grading, filling, contouring,  
38          and other ground-disturbing operations. Construction-related noise and visual disturbances could  
39          disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
40          result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
41          *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse

1 effects on active nests. The use of mechanical equipment during water conveyance construction  
2 could cause the accidental release of petroleum or other contaminants that could affect these  
3 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*  
4 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.  
5 The inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern  
6 harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that  
7 measures are in place to prevent runoff from the construction area and the negative effects of dust  
8 on wildlife adjacent to work areas.

9 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
10 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)  
11 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
12 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
13 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
14 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
15 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
16 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
17 specific effects. Increased methylmercury associated with natural community and floodplain  
18 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic  
19 levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

20 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
21 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
22 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
23 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
24 adaptive management as described in CM12 would be available to address the uncertainty of  
25 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and  
26 northern harrier.

27 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
28 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
29 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
30 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
31 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
32 classes within a species. In addition, the effect of selenium on a species can be confounded by  
33 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
34 2009).

35 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
36 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
37 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
38 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
39 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
40 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
41 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
42 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
43 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
44 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic

1 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
2 levels of selenium have a higher risk of selenium toxicity.

3 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
4 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
5 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern  
6 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
7 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
8 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
9 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
10 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
11 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
12 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
13 alternative. However, it is difficult to determine whether the effects of potential increases in  
14 selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)  
15 would lead to adverse effects on short-eared owl and northern harrier.

16 Because of the uncertainty that exists at this programmatic level of review, there could be a  
17 substantial effect on short-eared owl and northern harrier from increases in selenium associated  
18 with restoration activities. This effect would be addressed through the implementation of *AMM27*  
19 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
20 provide specific tidal habitat restoration design elements to reduce the potential for  
21 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
22 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
23 evaluated separately for each restoration effort as part of design and implementation. This  
24 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
25 design schedule.

26 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
27 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.  
28 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
29 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-  
30 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*  
31 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
32 address adverse effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat restoration  
33 could result in increased exposure of short-eared owl and northern harrier. This effect would be  
34 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
35 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
36 selenium and its bioavailability in tidal habitats.

37 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern  
38 harrier through increased exposure to methylmercury, as these species currently nest and forage in  
39 tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
40 concentrations of methylmercury are harmful to the species and the potential for increased  
41 exposure varies substantially within the study area. Site-specific restoration plans in addition to  
42 monitoring and adaptive management, described in *CM12 Methylmercury Management*, would  
43 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning  
44 phase of marsh restoration would be the appropriate place to assess the potential for risk of

1 methylmercury exposure for California least tern, once site specific sampling and other information  
2 could be developed.

3 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
4 operations and maintenance of the water conveyance facilities would have a less-than-significant  
5 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure  
6 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds* and  
7 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl  
8 and northern harrier through increased exposure to methylmercury, as these species currently nest  
9 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown  
10 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans  
11 that address the creation and mobilization of mercury, as well as monitoring and adaptive  
12 management as described in CM12 would better inform potential impacts and address the  
13 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat  
14 restoration could result in increased exposure of short-eared owl and northern harrier. This effect  
15 would be addressed through the implementation of *AMM27 Selenium Management*, which would  
16 provide specific tidal habitat restoration design elements to reduce the potential for  
17 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
18 Alternative 1B implementation would not have an adverse effect on short-eared owl and northern  
19 harrier.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
21 **Disturbance of Nesting Birds**

22 See Mitigation Measure BIO-75 under Impact BIO-75.

23 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**  
24 **Result of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
26 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926–  
27 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-1B-46).

28 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
29 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled  
30 habitat (Table 12-1B-46), the majority of which would be pasture and other cultivated lands.

31 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
32 season due to periodic inundation. However, inundation would occur during the nonbreeding  
33 season and would not be expected to have an adverse effect on either species.

34 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-  
35 eared owl and northern harrier because inundation is expected to occur prior to the breeding  
36 season.

37 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-  
38 eared owl and northern harrier because inundation is expected to occur prior to the breeding  
39 season.

1 **Redhead and Tule Greater White-Fronted Goose**

2 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are  
3 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178  
4 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be  
5 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

6 **Mountain Plover**

7 This section describes the effects of Alternative 1B, including water conveyance facilities  
8 construction and implementation of other conservation components, on mountain plover. Modeled  
9 habitat for mountain plover include grassland, alkali seasonal wetland, vernal pool complex, alfalfa,  
10 grain and hay, pasture, and idle cropland throughout the study area.

11 Construction and restoration associated with Alternative 1B conservation measures would result in  
12 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table  
13 12-1B-47. Full implementation of Alternative 1B would include the following biological objectives  
14 over the term of the BDCP which would also benefit the mountain plover (BDCP Chapter 3,  
15 *Conservation Strategy*).

- 16 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
17 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
18 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 19 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 20 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
21 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 22 ● Increase prey availability and accessibility for grassland-foraging species (Objectives  
23 ASWNC2.4, VPNC2.5, GNC2.4, associated with CM11).
- 24 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
25 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 26 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
27 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
28 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

29 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
30 management activities that would enhance these natural communities for the species, impacts on  
31 mountain plover would not be adverse for NEPA purposes and would be less than significant for  
32 CEQA purposes.

**Table 12-1B-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Wintering	2,962	2,962	4,528	4,528	NA	NA
<b>Total Impacts CM1</b>		<b>2,962</b>	<b>2,962</b>	<b>4,528</b>	<b>4,528</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Wintering	5,450	26,198	376	893	1,158–3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158–3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>8,412</b>	<b>29,160</b>	<b>4,904</b>	<b>5,421</b>	<b>1,158–3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

Alternative 1B conservation measures would result in the combined permanent and temporary loss of up to 34,581 acres of modeled habitat for mountain plover (29,160 acres of permanent loss and 5,421 of temporary loss, Table 12-1B-47). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would result in the combined permanent and temporary loss of up to loss of up to 7,490 acres of modeled mountain plover wintering habitat (2,962 acres of permanent loss, 4,528 acres of temporary loss) from CZ 4, CZ 5, CZ 6, CZ 7 and CZ 8. The primary impact is from the construction of the canal and from the potential borrow and spoil areas on either side of the canal throughout the central Delta. The CM1 construction footprint does not overlap with any occurrences of mountain plover. However, the study area does overlap with the wintering range



1 for the species and suitable habitat exists throughout the study area. Refer to the Terrestrial  
2 Biology Map Book for a detailed view of Alternative 1B construction locations.

- 3 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
4 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
5 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in  
6 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.  
7 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,  
8 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek  
9 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new  
10 channel is constructed. The loss is expected to occur during the first 10 years of Alternative 1B  
11 implementation.
- 12 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
13 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover  
14 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or  
15 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the  
16 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to  
17 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment  
18 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area  
19 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat  
20 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun  
21 Marsh.
- 22 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
23 seasonally inundated floodplain would permanently and temporarily remove approximately  
24 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses  
25 would be expected after the first 10 years of Alternative 1B implementation along the San  
26 Joaquin River and other major waterways in CZ 7.
- 27 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
28 approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and  
29 1,489 acres of habitat as part of seasonal floodplain restoration.
- 30 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
31 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
32 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
33 would be restored after the construction periods. Grassland restoration would be implemented  
34 on agricultural lands that also provide wintering habitat for mountain plover and would result  
35 in the conversion of 837 acres of cultivated lands to grassland.
- 36 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would  
37 result in the permanent removal of 705 acres of mountain plover habitat.
- 38 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
39 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
40 habitats could result in localized ground disturbances that could temporarily remove small  
41 amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative  
42 vegetation and road and other infrastructure maintenance activities, would be expected to have  
43 minor adverse effects on available mountain plover habitat. CM11 would also include the  
44 construction of recreational-related facilities including trails, interpretive signs, and picnic

1 tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of  
2 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
3 disturbed areas when and where possible. However, approximately 50 acres of grassland  
4 habitat would be lost from the construction of trails and facilities.

- 5 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
6 modeled mountain plover habitat for the development of a delta and longfin smelt conservation  
7 hatchery in CZ 1.
- 8 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
9 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
10 disturbances that could affect mountain plover use of the surrounding habitat. Maintenance  
11 activities would include vegetation management, levee and structure repair, and re-grading of  
12 roads and permanent work areas. These effects, however, would be reduced by AMM1–  
13 AMM7 and conservation actions as described below.
- 14 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
15 mountain plover because foraging individuals would be expected to temporarily avoid the  
16 increased noise and activity associated with construction areas.

17 The following paragraphs summarize the combined effects discussed above and describe other  
18 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
19 included.

#### 20 ***Near-Term Timeframe***

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
23 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
24 effects of construction would not be adverse under NEPA. The Plan would remove 13,316 acres  
25 (8,412 permanent, 4,904 temporary) of modeled mountain plover wintering habitat in the study  
26 area in the near-term. These effects would result from the construction of the water conveyance  
27 facilities (CM1, 7,490 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
28 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
29 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
30 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
31 and *CM18 Conservation Hatcheries*—5,826 acres).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
33 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be  
34 protected to compensate for the CM1 losses of 7,490 acres of mountain plover wintering habitat.  
35 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
36 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
37 NEPA and CEQA ratio (2:1 for protection).

38 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
39 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
40 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
41 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
42 in the same timeframe as the construction and early restoration losses thereby avoiding adverse  
43 effects of habitat loss on mountain plover wintering in the study area. Grassland restoration and

1 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
2 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
3 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
4 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand  
5 mountain plover wintering habitat and reduce the effects of current levels of habitat fragmentation.  
6 Under *CM11 Natural Communities Enhancement and Management*, insect prey populations would be  
7 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
8 ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other  
9 native wildlife species would provide approximately 15,400 acres of potential wintering habitat for  
10 mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late  
11 long-term time period would be in alfalfa and pasture crop types (very high- and high-value crop  
12 types for Swainson's hawk (Objective SH1.2) which are also modeled habitat for wintering mountain  
13 plover. This biological objective provides an estimate for the high proportion of cultivated lands  
14 protected in the near-term time period which would be suitable for mountain plover.

15 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
16 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
17 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
18 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
19 timeframe would need to include suitable crop types for these species in order to avoid an adverse  
20 effect of habitat loss from CM1. The conservation commitment is 7,572 acres short of meeting the  
21 compensation for other near-term effects on mountain plover habitat. Mitigation Measure BIO-125,  
22 *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, would be available to  
23 address the adverse effect of near-term high-value habitat loss by providing crop management  
24 requirements for CM1 compensation and requiring acreage compensation for the other near-term  
25 effects.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
31 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
32 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 33 **Late Long-Term Timeframe**

34 Based on the habitat model, the study area supports approximately 269,411 acres of potential  
35 habitat for mountain plover. Alternative 1B as a whole would result in the permanent loss of and  
36 temporary effects on 34,631 acres of modeled mountain plover wintering habitat during the term of  
37 the Plan (13% of the total habitat in the study area). The locations of these losses are described  
38 above in the analyses of individual conservation measures. The Plan includes conservation  
39 commitments through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural*  
40 *Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to  
41 protect 8,000 acres and restore 2,000 acres of grassland natural community, protect 600 acres of  
42 vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres  
43 of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).  
44 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
45 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and

1 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
2 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
3 would expand habitat for mountain plover and reduce the effects of current levels of habitat  
4 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
5 populations would be increased on protected lands, enhancing the foraging value of these natural  
6 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for  
7 covered and other native wildlife species would provide approximately 15,400 acres of potential  
8 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 42,275 acres of  
9 cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-value crop  
10 types for Swainson's hawk (Objective SH1.2) which would also provide potential wintering habitat  
11 for mountain plover. The Plan also includes commitments to implement *AMM1 Worker Awareness  
12 Training, AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater  
13 Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention,  
14 Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel  
15 Material, and Dredged Material, and AMM7 Barge Operations Plan*. All of these AMMs include  
16 elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent  
17 to work areas. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization  
18 Measures*.

19 **NEPA Effects:** The loss of mountain plover habitat and potential for mortality of this special-status  
20 species under Alternative 1B would represent an adverse effect in the absence of other conservation  
21 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and  
22 CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place  
23 throughout the construction period, and with implementation of Mitigation Measure BIO-125,  
24 *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss  
25 and potential for direct mortality on mountain plover under Alternative 1B would not be adverse.

26 **CEQA Conclusion:**

27 **Near-Term Timeframe**

28 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
29 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
30 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
31 effects of construction would be less than significant under CEQA. The Plan would remove 13,316  
32 acres (8,412 permanent, 4,904 temporary) of modeled mountain plover wintering habitat in the  
33 study area in the near-term. These effects would result from the construction of the water  
34 conveyance facilities (CM1, 7,490 acres), and implementing other conservation measures (*CM2 Yolo  
35 Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural  
36 Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali  
37 Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management  
38 and CM18 Conservation Hatcheries—5,826 acres*).

39 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
40 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be  
41 protected to compensate for the CM1 losses of 7,490 acres of mountain plover wintering habitat.  
42 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
43 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
44 NEPA and CEQA ratio (2:1 for protection).

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
4 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
5 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
6 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs  
7 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11  
8 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1  
9 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and  
10 vernal pool natural communities which would expand wintering habitat for mountain plover and  
11 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
12 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
13 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
14 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
15 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective  
16 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would  
17 be in alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk  
18 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the  
19 study area. This biological objective provides an estimate for the high proportion of cultivated lands  
20 protected in the near-term time period which would provide habitat for mountain plover.

21 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
22 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
23 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
24 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
25 timeframe would need to include suitable crop types for these species in order to avoid the  
26 significant impact of habitat loss resulting from CM1. The conservation commitment is 7,572 acres  
27 short of meeting the compensation for other near-term effects on mountain plover habitat.  
28 Implementation of Mitigation Measure BIO-125, *Compensate for the Near-Term Loss of Mountain*  
29 *Plover Wintering Habitat*, would reduce the impact of near-term habitat loss to a less-than-  
30 significant level.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
35 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
36 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
37 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 38 **Late Long-Term Timeframe**

39 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 34,631  
40 acres of mountain plover habitat during the term of the Plan (13% of the total habitat in the study  
41 area). The locations of these losses are described above in the analyses of individual conservation  
42 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
43 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
44 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
45 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali

1 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
2 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
3 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
4 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
5 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
6 wetland, and vernal pool natural communities which would expand wintering habitat for mountain  
7 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*  
8 *Communities Enhancement and Management*, insect prey populations would be increased on  
9 protected lands, enhancing the foraging value of these natural communities (Objectives  
10 ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native  
11 wildlife species would provide approximately 15,400 acres of potential habitat for mountain plover  
12 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
13 and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective SH1.2)  
14 which would also provide habitat for mountain plover.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

22 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
23 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
24 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
25 Mitigation Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering*  
26 *Habitat*, the loss of habitat or direct mortality through implementation of Alternative 1B4 would not  
27 result in a substantial adverse effect through habitat modifications and would not substantially  
28 reduce the number or restrict the range of mountain plover. Therefore, the loss of habitat or  
29 potential mortality under this alternative would have a less-than-significant impact on mountain  
30 plover.

### 31 **Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover** 32 **Wintering Habitat**

33 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
34 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value  
35 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland  
36 protection, enhancement, and management may be substituted for the protection of high-value  
37 cultivated lands.

### 38 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission** 39 **Facilities**

40 New transmission lines would increase the risk for bird-power line strikes, which could result in  
41 injury or mortality of mountain plover. Mountain plovers congregate in flocks during the winter and  
42 travel between grasslands and cultivated lands that provide foraging habitat for the species. This  
43 flocking behavior puts them at risk of collisions with powerlines. Existing transmission lines in the

1 study area currently pose this risk. Plovers are primarily visual foragers and therefore, the risk for  
2 collision would be reduced by *AMM20 Greater Sandhill Crane*, which would require the installation  
3 of bird flight diverters on new and selected existing transmission lines in the study area.

4 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover  
5 because mortality from powerline strikes would be minimized with the implementation of *AMM20*  
6 *Greater Sandhill Crane* which would require the installation of bird flight diverters on new and  
7 selected existing transmission lines in the study area. The risk for bird-power line strikes is,  
8 therefore, not expected to have an adverse effect on mountain plover.

9 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain  
10 plover because mortality from powerline strikes would be minimized with the implementation of  
11 *AMM20 Greater Sandhill Crane* which would require the installation of bird flight diverters on new  
12 and selected existing transmission lines in the study area.

### 13 **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

14 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt  
15 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction  
16 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from  
17 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*  
18 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
19 available data to determine the extent to which these noise levels could affect mountain plover.  
20 Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
21 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical  
22 equipment during water conveyance facilities construction could cause the accidental release of  
23 petroleum or other contaminants that could affect these species or their prey in the surrounding  
24 habitat. AMM1–AMM7 would minimize the likelihood of such spills from occurring. The inadvertent  
25 discharge of sediment or excessive dust adjacent to mountain plover grassland habitat could also  
26 have a negative effect on the species. However, AMM1–AMM7 would also ensure that measures  
27 would be in place to prevent runoff from the construction area and the negative effects of dust on  
28 wildlife adjacent to work areas.

29 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 1B implementation could  
30 have adverse effects on the species through the modification of habitat. With the With the  
31 implementation of AMM1–AMM7, indirect effects as a result of Alternative 1B implementation  
32 would not have an adverse effect mountain plover.

33 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 1B implementation  
34 could have a significant impact on the species from modification of habitat. With the implementation  
35 of AMM1–AMM7, indirect effects as a result of Alternative 1B implementation would have a less-  
36 than-significant impact on mountain plover.

### 37 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of** 38 **Implementation of Conservation Components**

39 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
40 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
41 3,650 acres of modeled mountain plover wintering habitat (Table 12-1B-47). Based on hypothetical  
42 footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration*, could result in the

1 periodic inundation of up to approximately 3,823 acres of modeled mountain plover habitat (Table  
2 12-1B-47).

3 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
4 plover foraging habitat. However, effects of periodic inundation would not have an adverse effect on  
5 mountain plover because birds would be expected to move to adjacent foraging habitat.

6 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
7 plover foraging habitat. However, effects of periodic inundation would have a less-than-significant  
8 impact on mountain plover because birds would be expected to move to adjacent foraging habitat.

### 9 **Black Tern**

10 This section describes the effects of Alternative 1B, including water conveyance facilities  
11 construction and implementation of other conservation components, on black tern. Modeled nesting  
12 habitat for black tern in the study area is currently limited to rice in CZ 2.

13 Construction and restoration associated with Alternative 1B conservation measures would result in  
14 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-1B-  
15 48. Full implementation of Alternative 1B would include the following biological objectives over the  
16 term of the BDCP which would also benefit the black tern (BDCP Chapter 3, *Conservation Strategy*).

- 17 ● Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand  
18 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,  
19 associated with CM3).
- 20 ● Protect up to 1,700 acres of rice land or equivalent habitat (e.g. perennial wetland) in the Yolo  
21 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by Species*  
22 for giant garter snake. Any remaining acreage (from a total 2,740 acre commitment) will consist  
23 of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5 (Objective  
24 GGS3.1, associated with CM3).

25 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
26 management activities that would enhance this habitat for the species and implementation of  
27 AMM1–AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA  
28 purposes and would be less than significant for CEQA purposes.



1 **Table 12-1B-48. Changes in Black Tern Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	76	260	0	0	791–1,582	0
<b>Total Impacts CM2–CM18</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791–1,582</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791–1,582</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

4 Alternative 1B conservation measures would result in the permanent loss of up to 260 acres of  
5 modeled nesting habitat for black tern, consisting of rice in CZ 2 (Table 12-1B-48). Conservation  
6 measures that would result in these losses are grassland restoration (CM8) and nontidal marsh  
7 restoration (CM10). Each of these individual activities is described below. A summary statement of  
8 the combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation  
9 measure discussions.

- 10 • *CM8 Grassland Natural Community Restoration:* Restoration of grassland is expected to be  
11 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands  
12 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in  
13 the first 10 years.
- 14 • *CM10 Nontidal Marsh Restoration:* Implementation of *CM10* would result in the permanent  
15 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be  
16 removed in the first 10 years.

17 *CM11 Natural Communities Enhancement and Management:* A variety of habitat management  
18 actions that are designed to enhance wildlife values in restored or protected habitats could  
19 result in localized ground disturbances that could temporarily remove small amounts of  
20 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road  
21 and other infrastructure maintenance activities, would be expected to have minor adverse  
22 effects on available habitat and would be expected to result in overall improvements to and  
23 maintenance of habitat values over the term of the BDCP. Habitat management- and  
24 enhancement-related activities could disturb nesting black terns if they were to nest in the  
25 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual

1 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The  
2 potential for these activities to result in direct mortality of black tern would be minimized with  
3 the implementation of and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
4 *Surveys and Avoid Disturbance of Nesting Birds*.

- 5 ● Operations and Maintenance: Postconstruction operation and maintenance of the restoration  
6 infrastructure could result in ongoing but periodic disturbances that could affect black tern  
7 nesting adjacent to maintenance areas. Maintenance activities would include vegetation  
8 management, levee and structure repair, and re-grading of roads and permanent work areas.  
9 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and  
10 conservation actions as described below.
- 11 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
12 direct mortality of adult or fledged black tern individuals if they were present in the study area,  
13 because they would be expected to avoid contact with construction and other equipment. If  
14 black tern were to nest in the construction area, construction-related activities, including  
15 equipment operation, noise and visual disturbances could destroy nests or lead to their  
16 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and  
17 minimized with the implementation of Mitigation Measure BIO-75.
- 18 ● Late season flooding in the Yolo Bypass could result in the loss of rice (nesting habitat for black  
19 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss  
20 of rice in the bypass and results are provided in BDCP Appendix J, Attachment 5J.E, *Estimation of*  
21 *BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis  
22 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term  
23 timeframe. This potential impact is further described under Impact BIO-129c below.

24 The following paragraphs summarize the combined effects discussed above and describe other  
25 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
26 included.

### 27 ***Near-Term Timeframe***

28 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
29 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
30 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
31 effects of construction would not be adverse under NEPA. There would be no impacts on black tern  
32 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,  
33 there would be a loss of 76 acres of modeled nesting habitat for black tern in the study area in the  
34 near-term. These effects would result from implementing *CM8 Grassland Natural Community*  
35 *Restoration* and *CM10 Nontidal Marsh Restoration*.

36 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
37 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
38 protected in CZ 2 to compensate for the losses of black tern nesting habitat.

39 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
40 equivalent habitat (Table 3-4 in Chapter 3). These conservation actions are associated with CM3 and  
41 would occur in the same timeframe as the early restoration losses. The BDCP also contains  
42 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to  
43 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria

1 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3  
2 and GGS 3.1) by the late long-term time period. These objectives would inform the nearterm  
3 protection actions, and therefore some portion of the 200 acres of rice and 700 acres of rice or  
4 equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term acreage  
5 commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black tern from  
6 habitat loss, protection of 76 acres of rice would need to occur in CZ 2 in the nearterm timeframe.  
7 Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, would be available  
8 to address this adverse effect.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
13 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
14 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
15 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
16 covered species under the BDCP and in order to avoid an adverse effect on individuals,  
17 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
18 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
19 *Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

#### 20 **Late Long-Term Timeframe**

21 Alternative 1B as a whole would result in the permanent loss of 260 acres of modeled black tern  
22 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
23 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
24 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
25 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat  
26 for black tern in the northern part of the study area has largely been reduced to rice lands, and these  
27 acres would provide protected nesting habitat for the species.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *CM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
35 covered species under the BDCP and in order to avoid an adverse effect on individuals,  
36 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
37 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
38 *Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

39 **NEPA Effects:** The loss of black tern nesting habitat and potential for mortality of this special-status  
40 species under Alternative 1B would represent an adverse effect in the absence of other conservation  
41 actions. With habitat protection associated with CM3, guided by biological goals and objectives and  
42 by AMM1–AMM7, which would be in place throughout the construction period, the effects of habitat  
43 loss under Alternative 1B would not be adverse under NEPA. Black tern is not a covered species  
44 under the BDCP and the potential for mortality would be adverse without preconstruction surveys  
45 to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*

1 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
2 adverse effect.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 effects of construction would be less than significant under CEQA. There would be no impacts on  
9 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).  
10 However, there would be a loss of 76 acres of modeled nesting habitat for black tern in the study  
11 area in the near-term. These effects would result from implementing *CM8 Grassland Natural*  
12 *Community Restoration* and *CM10 Nontidal Marsh Restoration*.

13 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
14 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
15 protected in CZ 2 to mitigate the losses of black tern nesting habitat.

16 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
17 equivalent habitat (Table 3-4 in Chapter 3). These conservation actions are associated with CM3 and  
18 would occur in the same timeframe as the early restoration losses. The BDCP also contains  
19 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to  
20 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria  
21 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3  
22 and GGS 3.1) by the late long-term time period. These objectives would inform the near-term  
23 protection actions, and therefore some portion of the 200 acres of rice and 700 acres of rice or  
24 equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term acreage  
25 commitment in the plan that is specific to CZ 2. Mitigation Measure BIO-129a, *Compensate for Loss of*  
26 *Black Tern Nesting Habitat*, which would require 1:1 protection of habitat in CZ 2 in the near-term  
27 timeframe, would reduce this potential impact to a less-than-significant level.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
35 covered species under the BDCP and in order to have a less-than-significant impact on individuals,  
36 preconstruction would be required to ensure that nests are detected and avoided. Mitigation  
37 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
38 *Birds*, would reduce the potential impact on nesting black tern to a less-than-significant level.

39 **Late Long-Term Timeframe**

40 Alternative 1B as a whole would result in the permanent loss of 260 acres of modeled black tern  
41 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
42 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*

1 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
2 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
4 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
5 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
8 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
9 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
10 BDCP and in order to avoid an adverse effect on individuals, preconstruction surveys for  
11 noncovered avian species would be required to ensure that nests are detected and avoided.  
12 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
13 *Nesting Birds*, reduce the potential impact on nesting black tern to a less-than-significant level.

14 Considering these protection provisions, which would provide acreages of new or enhanced habitat  
15 in amounts greater than necessary to compensate for habitats lost to construction and restoration  
16 activities, loss of habitat or direct mortality through implementation of Alternative 1B would not  
17 result in a substantial adverse effect through habitat modifications and would not substantially  
18 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-  
19 than-significant impact on black tern.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
21 **Disturbance of Nesting Birds**

22 See Mitigation Measure BIO-75 under Impact BIO-75.

23 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

24 Because there is no near-term acreage commitment associated with the protection of rice in CZ  
25 2, BDCP proponents must protect rice at a 1:1 ratio for each acre of rice impacted in CZ 2.

26 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

27 Construction noise above background noise levels (greater than 50 dBA) could extend 1,900 to  
28 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
29 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
30 are no available data to determine the extent to which these noise levels could affect black tern. If  
31 black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-  
32 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and  
33 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,  
34 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid  
35 the potential for adverse effects of construction-related activities on survival and productivity of  
36 nesting black terns. The use of mechanical equipment during restoration activities could cause the  
37 accidental release of petroleum or other contaminants that could affect black terns in the  
38 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable  
39 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*  
40 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such  
41 spills and ensure that measures are in place to prevent runoff from the construction area and  
42 negative effects of dust on active nests.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
5 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
6 classes within a species. In addition, the effect of selenium on a species can be confounded by  
7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
18 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
23 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and  
24 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase  
25 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration  
26 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP  
27 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations  
28 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing  
29 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases  
30 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to  
31 determine whether the effects of potential increases in selenium bioavailability associated with  
32 restoration-related conservation measures (CM4–CM5) would lead to adverse effects on black tern.

33 Because of the uncertainty that exists at this programmatic level of review, there could be an effect  
34 on black tern from increases in selenium associated with restoration activities. This effect would be  
35 addressed through the implementation of *AMM27 Selenium Management* (BDCP Appendix 3.C,  
36 *Avoidance and Minimization Measures*) which would provide specific tidal habitat restoration design  
37 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
38 habitats. Furthermore, the effectiveness of selenium management to reduce selenium  
39 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as  
40 part of design and implementation. This avoidance and minimization measure would be  
41 implemented as part of the tidal habitat restoration design schedule.

42 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components  
43 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
44 equipment for the construction of conservation components could cause the accidental release of  
45 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent

1 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
2 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on  
3 nesting individuals. Tidal habitat restoration could result in increased exposure of black tern to  
4 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
5 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
6 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

7 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components  
8 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
9 equipment for the construction of conservation components could cause the accidental release of  
10 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
11 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
12 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these impacts on a less-than-  
13 significant level. Tidal habitat restoration could result in increased exposure of black tern to  
14 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
15 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
16 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

#### 17 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of** 18 **Implementation of Conservation Components**

19 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat  
20 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season  
21 but could reduce the availability of nesting habitat during years that flooding extends into the  
22 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to  
23 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,  
24 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo  
25 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation  
26 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are  
27 provided in BDCP Appendix J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*  
28 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice  
29 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,  
30 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of  
31 rice would be protected in areas that are less susceptible to inundation, which would benefit the  
32 black tern during years in which the magnitude and duration of inundation were increased.

33 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for  
34 black tern. However, if flooding were to extend into the nesting season or were to significantly  
35 reduce rice production, it could also reduce suitable black tern nesting habitat. This potential effect  
36 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under BDCP  
37 Objective GGS3.1.

38 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on  
39 nesting habitat for black tern. However, if flooding were to significantly reduce rice production and  
40 reduce suitable black tern nesting habitat, this impact would be reduced to a less-than-significant  
41 level by the creation and/or protection of 1,700 acres of rice in CZ 2 under BDCP Objective GGS3.1.

1 **California Horned Lark and Grasshopper Sparrow**

2 This section describes the effects of Alternative 1B, including water conveyance facilities  
3 construction and implementation of other conservation components, on California horned lark and  
4 grasshopper sparrow. The primary impact of concern for grasshopper sparrow and California  
5 horned lark would be the loss of nest habitat in the Plan Area, which includes grassland, vernal pool  
6 complex, and alkali seasonal wetland natural communities and selected cultivated lands including  
7 grain and hay crops and pasture.

8 Construction and restoration associated with Alternative 1B conservation measures would result in  
9 both temporary and permanent losses of modeled breeding habitat for California horned lark and  
10 grasshopper sparrow as indicated in Table 12-1B-49. Full implementation of Alternative 1B would  
11 include the following biological objectives over the term of the BDCP which would also benefit the  
12 California horned lark and the grasshopper sparrow (BDCP Chapter 3, *Conservation Strategy*).

- 13 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
14 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
15 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 16 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 17 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
18 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 19 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
20 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 21 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
22 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
23 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 24 ● Increase prey availability and accessibility for grassland-foraging species (Objectives  
25 ASWNC2.4, VPNC2.5, and GNC2.4, associated with CM11).

26 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
27 management activities that would enhance habitat for these species and implementation of AMM1-  
28 AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow  
29 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.



1 **Table 12-1B-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**  
2 **Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	2,962	2,962	4,528	4,528	NA	NA
<b>Total Impacts CM1</b>		<b>2,962</b>	<b>2,962</b>	<b>4,528</b>	<b>4,528</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Breeding	5,450	26,198	376	893	777-2,423	3,823
<b>Total Impacts CM2-CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>777-2,423</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>8,412</b>	<b>29,160</b>	<b>4,904</b>	<b>5,421</b>	<b>777-2,423</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**  
5 **Lark and Grasshopper Sparrow**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
7 of up to 34,581 acres of modeled breeding habitat for California horned lark and grasshopper  
8 sparrow (29,160 acres of permanent loss and 5,421 acres of temporary loss; Table 12-1B-49).  
9 Conservation measures that would result in these losses are conveyance facilities and transmission  
10 line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries  
11 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian  
12 restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),  
13 nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The  
14 majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and  
15 management activities (CM11), which include ground disturbance or removal of nonnative  
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local  
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation  
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate  
19 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities  
20 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
21 conclusion follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would  
23 result in the combined permanent and temporary loss of up to 7,490 acres of modeled California  
24 horned lark and grasshopper sparrow habitat (2,962 acres of permanent loss, 4,528 acres of  
25 temporary loss) in CZ 4, CZ 5, CZ 6, CZ 7, and CZ 8. Habitat losses would occur at various  
26 locations along the new canal route from the construction of the canal and the associated

1 borrow and spoil sites and at the intake sites along the Sacramento River. Permanent and  
2 temporary losses of foraging habitat would also occur at the new forebay site just south of  
3 Clifton Court Forebay and associated borrow and spoil sites. Approximately 685 acres of impact  
4 would be from the new forebay constructed south of the Clifton Court Forebay in CZ 8.  
5 Grasshopper sparrows were detected in DHCCP surveys south of Byron Highway in CZ 8 (1  
6 occurrence) and east of Intakes 2 and 3 (6 occurrences), in the Stone Lakes NWR. However, the  
7 CM1 footprint does not overlap with any grasshopper sparrow or California horned lark  
8 occurrences. However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*  
9 *and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the  
10 establishment of no-disturbance buffers and would be available to address potential effects on  
11 California horned larks and grasshopper sparrows if they were to nest in or adjacent to  
12 construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative  
13 1B construction locations.

- 14 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
15 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
16 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres  
17 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
18 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
19 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
20 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
21 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
22 years of Alternative 1B implementation.
- 23 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
24 inundation would permanently remove an estimated 20,880 acres of modeled California horned  
25 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated  
26 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache  
27 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and  
28 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
29 directly impact and fragment grassland just north of Rio Vista in and around French and  
30 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
31 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
32 the northern fringes of Suisun Marsh.
- 33 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
34 seasonally inundated floodplain would permanently and temporarily remove approximately  
35 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933  
36 permanent, 517 temporary). These losses would be expected after the first 10 years of  
37 Alternative 1B implementation along the San Joaquin River and other major waterways in CZ 7.
- 38 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
39 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as  
40 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 41 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
42 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
43 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
44 would be restored after the construction periods. Grassland restoration would be implemented  
45 on agricultural lands that also provide nesting habitat for California horned lark and

1 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to  
2 grassland.

- 3 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would  
4 result in the permanent removal of 705 acres of California horned lark and grasshopper  
5 sparrow nesting habitat.
- 6 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
7 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
8 habitats could result in localized ground disturbances that could temporarily remove small  
9 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
10 vegetation and road and other infrastructure maintenance activities, would be expected to have  
11 minor adverse effects on available habitat and would be expected to result in overall  
12 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
13 also include the construction of recreational-related facilities including trails, interpretive signs,  
14 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
15 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
16 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
17 of grassland habitat would be lost from the construction of trails and facilities.

18 Habitat management- and enhancement-related activities could disturb California horned lark  
19 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,  
20 equipment operation could destroy nests, and noise and visual disturbances could lead to their  
21 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*  
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available  
23 to address these adverse effects.

- 24 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
25 modeled California horned lark and grasshopper sparrow habitat for the development of a delta  
26 and longfin smelt conservation hatchery in CZ 1.
- 27 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
28 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
29 disturbances that could affect California horned lark and grasshopper sparrow use of the  
30 surrounding habitat. Maintenance activities would include vegetation management, levee and  
31 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
32 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as  
33 described below.
- 34 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
35 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were  
36 present in the Plan Area, because they would be expected to avoid contact with construction and  
37 other equipment. If either species were to nest in the construction area, construction-related  
38 activities, including equipment operation, noise and visual disturbances could destroy nests or  
39 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
40 75 would be available to address these adverse effects.

41 The following paragraphs summarize the combined effects discussed above and describe other  
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. The Plan would remove 13,316 acres  
6 (8,412 permanent, 4,904 temporary) of modeled breeding habitat for California horned lark and  
7 grasshopper sparrow in the study area in the near-term. These effects would result from the  
8 construction of the water conveyance facilities (CM1, 7,490 acres), and implementing other  
9 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
10 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
11 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
12 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

13 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
14 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be  
15 protected to compensate for the CM1 losses of 7,490 acres of California horned lark and  
16 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
17 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
18 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
19 (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
23 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
24 in the same timeframe as the construction and early restoration losses thereby avoiding adverse  
25 effects of habitat loss on California horned lark and grasshopper sparrow. Grassland restoration and  
26 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
27 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
28 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
29 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand  
30 breeding habitat for California horned lark and grasshopper sparrow and reduce the effects of  
31 current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*  
32 *Management*, insect prey populations would be increased on protected lands, enhancing the  
33 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
34 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
35 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
36 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-  
37 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types  
38 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for  
39 California horned lark and grasshopper sparrow. This biological objective provides an estimate for  
40 the high proportion of cultivated lands protected in the near-term time period which would provide  
41 nesting habitat for California horned lark and grasshopper sparrow.

42 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
43 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
44 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
45 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term

1 timeframe would need to include suitable crop types for these species in order to avoid an adverse  
2 effect of habitat loss from CM1. The conservation commitment is 7,572 acres short of meeting the  
3 compensation for other near-term effects on California horned lark and grasshopper sparrow  
4 habitat. Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark  
5 and Grasshopper Sparrow Habitat*, would be available to address the adverse effect of near-term  
6 high-value habitat loss by providing crop management requirements for CM1 compensation and  
7 requiring additional acreage compensation for the other near-term effects.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2  
9 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention  
10 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and  
11 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
12 Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
13 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
14 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

15 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
16 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
17 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
18 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
19 available to address this adverse effect.

#### 20 **Late Long-Term Timeframe**

21 Based on the habitat model, the study area supports approximately 269,411 acres of potential  
22 habitat for California horned lark and grasshopper sparrow. Alternative 1B as a whole would result  
23 in the permanent loss of and temporary effects on 34,631 acres of modeled California horned lark  
24 and grasshopper sparrow habitat during the term of the Plan (13% of the total habitat in the study  
25 area). The locations of these losses are described above in the analyses of individual conservation  
26 measures. The Plan includes conservation commitments through *CM3 Natural Communities  
27 Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and  
28 Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
29 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
30 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
31 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
32 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
33 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
34 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
35 wetland, and vernal pool natural communities which would expand breeding habitat for California  
36 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
37 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
38 populations would be increased on protected lands, enhancing the foraging value of these natural  
39 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for  
40 covered and other native wildlife species would provide approximately 15,400 acres of potential  
41 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
42 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types.  
43 These are very high- and high-value crop types for Swainson's hawk (Objective SH1.2) and would  
44 provide potential nesting habitat for California horned lark and grasshopper sparrow.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. California horned*  
8 *lark and grasshopper sparrow are not covered species under the BDCP. For the BDCP to avoid an*  
9 *adverse effect on individuals, preconstruction surveys for noncovered avian species would be*  
10 *required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, Conduct*  
11 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would be available to*  
12 *address this adverse effect.*

13 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential for  
14 mortality of these special-status species under Alternative 1B would represent an adverse effect in  
15 the absence of other conservation actions. However, with habitat protection and restoration  
16 associated with CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–  
17 AMM7, which would be in place throughout the construction period, and with implementation of  
18 Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and*  
19 *Grasshopper Sparrow Habitat*, the effects of habitat loss under Alternative 1B4 on California horned  
20 lark and grasshopper sparrow would not be adverse. California horned lark and grasshopper  
21 sparrow are not covered species under the BDCP and the potential for mortality would be an  
22 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.  
23 Mitigation Measure BIO-75 would be available to address this effect.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
29 effects of construction would be less than significant under CEQA. The Plan would remove 13,316  
30 acres (8,412 permanent, 4,904 temporary) of modeled breeding habitat for California horned lark  
31 and grasshopper sparrow in the study area in the near-term. These effects would result from the  
32 construction of the water conveyance facilities (CM1, 7,490 acres), and implementing other  
33 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
34 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
35 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
36 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

37 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
38 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be  
39 protected to compensate for the CM1 losses of 7,490 acres of California horned lark and  
40 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
41 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
42 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
43 (2:1 for protection).

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
4 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
5 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
6 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection  
7 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in  
8 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes  
9 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali  
10 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for  
11 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
12 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
13 populations would be increased on protected lands, enhancing the foraging value of these natural  
14 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for  
15 covered and other native wildlife species would provide approximately 15,400 acres of potential  
16 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
17 Approximately 87% of cultivated lands protected by the late long-term time period would be in  
18 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
19 SH1.2) which would also provide potential nesting habitat for California horned lark and  
20 grasshopper sparrow. This biological objective provides an estimate for the high proportion of  
21 cultivated lands protected in the near-term time period which would provide nesting habitat for  
22 California horned lark and grasshopper sparrow.

23 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
24 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
25 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
26 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
27 timeframe would need to include suitable crop types for these species in order to avoid the  
28 significant impact of habitat loss resulting from CM1. The conservation commitment is 7,572 acres  
29 short of meeting the compensation for other near-term effects on California horned lark and  
30 grasshopper sparrow habitat. Implementation of Mitigation Measure BIO-130, *Compensate for the*  
31 *Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*, would reduce the  
32 impact of near-term high-value habitat loss by providing crop management requirements for CM1  
33 compensation and requiring additional acreage compensation for the other near-term effects.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
39 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
40 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

41 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
42 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
43 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
44 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
45 reduce this potential impact to a less-than-significant level.

1 **Late Long-Term Timeframe**

2 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 34,631  
3 acres of California horned lark and grasshopper sparrow habitat during the term of the Plan (13% of  
4 the total habitat in the study area). The locations of these losses are described above in the analyses  
5 of individual conservation measures. The locations of these losses are described above in the  
6 analyses of individual conservation measures. The Plan includes conservation commitments  
7 through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural Community*  
8 *Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000  
9 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
10 complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres of  
11 cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).  
12 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
13 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
14 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
15 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
16 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the  
17 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
18 *and Management*, insect prey populations would be increased on protected lands, enhancing the  
19 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
20 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
21 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
22 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in  
23 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
24 SH1.2) which would also provide potential nesting habitat for California horned lark and  
25 grasshopper sparrow. The Plan also includes commitments to implement *AMM1 Worker Awareness*  
26 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*  
27 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*  
28 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
29 *Material, and Dredged Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include  
30 elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent  
31 to work areas. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
32 *Measures*. California horned lark and grasshopper sparrow are not covered species under the BDCP.  
33 For the BDCP to avoid significant impacts on individuals, preconstruction surveys for noncovered  
34 avian species would be required to ensure that nests are detected and avoided. Mitigation Measure  
35 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
36 reduce this potential impact to a less-than-significant level.

37 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
38 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
39 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
40 Measure BIO-75, and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California*  
41 *Horned Lark and Grasshopper Sparrow Habitat*, the loss of habitat or direct mortality through  
42 implementation of Alternative 1B would not result in a substantial adverse effect through habitat  
43 modifications and would not substantially reduce the number or restrict the range of either species.  
44 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-  
45 significant impact on California horned lark and grasshopper sparrow.



1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and**  
5           **Grasshopper Sparrow Habitat**

6           DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
7           crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the  
8           total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1  
9           protection. Additional grassland protection, enhancement, and management may be substituted  
10          for the protection of cultivated lands.

11          **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated**  
12          **with Electrical Transmission Facilities**

13          New transmission lines would increase the risk for bird-power line strikes, which could result in  
14          injury or mortality of grasshopper sparrow and California horned lark. *AMM20 Greater Sandhill*  
15          *Crane* would minimize the risk of bird strikes by installing flight-diverters on new and selected  
16          existing powerlines.

17          **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
18          could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
19          implementation of *AMM20 Greater Sandhill Crane* the effect of new transmission lines on California  
20          horned lark and grasshopper sparrow would not be adverse.

21          **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
22          could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
23          incorporation of *AMM20 Greater Sandhill Crane*, new transmission lines would have a less-than-  
24          significant impact on grasshopper sparrow and California horned lark.

25          **Impact BIO-132: Indirect Effects of Plan Implementation on California Horned Lark and**  
26          **Grasshopper Sparrow**

27          Noise and visual disturbances associated with construction-related activities could result in  
28          temporary disturbances that affect California horned lark and grasshopper sparrow use of modeled  
29          habitat. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900  
30          to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
31          *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
32          are no available data to determine the extent to which these noise levels could affect California  
33          horned lark or grasshopper sparrow. Indirect effects associated with construction include noise,  
34          dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
35          operations. Construction-related noise and visual disturbances could disrupt nesting and foraging  
36          behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on  
37          these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
38          *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use  
39          of mechanical equipment during water conveyance construction could cause the accidental release  
40          of petroleum or other contaminants that could affect these species or their prey in the surrounding  
41          habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,

1 would minimize the likelihood of such spills. The inadvertent discharge of sediment or excessive  
2 dust adjacent to California horned lark and grasshopper sparrow nesting habitat could also have a  
3 negative effect on these species. AMM1–AMM7 would ensure that measures are in place to prevent  
4 runoff from the construction area and the negative effects of dust on wildlife adjacent to work areas.

5 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of  
6 Alternative 1B implementation could have adverse effects on these species through the modification  
7 of habitat and potential for direct mortality. California horned lark and grasshopper sparrow are not  
8 covered species under the BDCP, and the potential for mortality would be adverse without  
9 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–  
10 AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
11 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

12 **CEQA Conclusion:** Indirect effects on California horned lark and grasshopper sparrow as a result of  
13 Alternative 1B implementation could have a significant impact on these species. The incorporation  
14 of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
15 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
16 impact to a less-than-significant level.

17 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
18 **Disturbance of Nesting Birds**

19 See Mitigation Measure BIO-75 under Impact BIO-75.

20 **Impact BIO-133: Periodic Effects of Inundation on California Horned Lark and Grasshopper**  
21 **Sparrow as a Result of Implementation of Conservation Components**

22 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
23 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158-  
24 3,650 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-1B-49).

25 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
26 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled  
27 habitat (Table 12-1B-49).

28 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
29 season due to periodic inundation. However, inundation would occur during the nonbreeding  
30 season and would not be expected to have an adverse effect on either species.

31 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper  
32 sparrow or California horned lark because inundation is expected to occur prior to the breeding  
33 season.

34 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on  
35 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the  
36 breeding season.

37 **Least Bittern and White-Faced Ibis**

38 This section describes the effects of Alternative 1B, including water conveyance facilities  
39 construction and implementation of other conservation components, on least bittern and white-  
40 faced ibis. Modeled breeding habitat for least bittern and white-faced ibis includes tidal freshwater

1 emergent wetlands, nontidal freshwater emergent wetlands, managed wetlands, and other natural  
2 seasonal wetlands in CZs 2, 4, and 11.

3 Construction and restoration associated with Alternative 1B conservation measures would result in  
4 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table  
5 12-1B-50. Full implementation of Alternative 1B would include the following biological objectives  
6 over the term of the BDCP which would also benefit least bittern and white-faced ibis (BDCP Chapter  
7 3, *Conservation Strategy*).

- 8 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
9 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 10 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
11 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
12 associated with CM10).
- 13 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
14 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

15 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
16 management activities that would enhance habitat for these species and implementation of AMM1-  
17 AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least bittern and  
18 white-faced ibis would not be adverse for NEPA purposes and would be less than significant for  
19 CEQA purposes.

20 **Table 12-1B-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with**  
21 **Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	6	6	5	5	NA	NA
<b>Total Impacts CM1</b>		<b>6</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	5,134	13,063	45	45	961-2,672	NA
<b>Total Impacts CM2-CM18</b>		<b>5,134</b>	<b>13,063</b>	<b>45</b>	<b>45</b>	<b>961-2,672</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>5,140</b>	<b>13,069</b>	<b>50</b>	<b>50</b>	<b>961-2,672</b>	<b>NA</b>

a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

b See discussion below for a description of applicable CMs.

c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

22

1 **Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and**  
2 **White-Faced Ibis**

3 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
4 and conversion of up to 13,119 acres of modeled habitat for least bittern and white-faced ibis  
5 (13,069 acres of permanent loss and conversion and 50 of temporary loss, Table 12-1B-50).

6 Conservation measures that would result in these losses are conveyance facilities and transmission  
7 line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass  
8 enhancements (CM2), and tidal habitat restoration (CM4). Habitat enhancement and management  
9 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,  
10 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
11 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
12 degrade or eliminate least bittern and white-faced ibis habitat. Each of these individual activities is  
13 described below. A summary statement of the combined impacts, NEPA effects, and a CEQA  
14 conclusion follow the individual conservation measure discussions.

- 15 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would  
16 result in the combined permanent and temporary loss of up to 11 acres of modeled least bittern  
17 and white-faced ibis habitat (6 acre of permanent loss, 5 acres of temporary loss) from CZ 4.  
18 Permanent losses would occur as a result of constructing the east canal. Small areas of emergent  
19 wetland and managed wetland would be removed where the canal would cross manmade  
20 channels. The temporary losses would also occur where small patches or stringers of wetlands  
21 would be removed for siphon construction. The construction footprint for CM1 does not overlap  
22 with any occurrences of least bittern or white-faced ibis. Mitigation Measure BIO-75, *Conduct*  
23 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available  
24 to address potential effects on least bittern or white-faced ibis if they were to nest in or adjacent  
25 to construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of  
26 Alternative 1B construction locations.
- 27 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
28 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the  
29 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is  
30 expected to occur during the first 10 years of Alternative 1B implementation.
- 31 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
32 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and  
33 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 34 ● *CM11 Natural Communities Enhancement and Management:* A variety of habitat management  
35 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
36 to enhance wildlife values in restored or protected habitats could result in localized ground  
37 disturbances that could temporarily remove small amounts of least bittern and white-faced ibis  
38 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and  
39 other infrastructure maintenance activities, would be expected to have minor adverse effects on  
40 available least bittern and white-faced ibis habitat.
- 41 ● *Operations and Maintenance:* Postconstruction operation and maintenance of the above-ground  
42 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
43 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.  
44 Maintenance activities would include vegetation management, levee and structure repair, and  
45 re-grading of roads and permanent work areas. These effects, however, would be reduced by

1 AMM1–AMM7 described below and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
2 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce  
3 potential effects.

- 4 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
5 direct mortality of least bittern and white-faced ibis because adults and fledged young would be  
6 expected to avoid contact with construction and other equipment. However, if either species  
7 were to nest in the construction area, equipment operation, noise and visual disturbances could  
8 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.  
9 Mitigation Measure BIO-75 would be available to address these adverse effects.

10 The following paragraphs summarize the combined effects discussed above and describe other  
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
12 included.

### 13 ***Near-Term Timeframe***

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
17 effects of construction would not be adverse under NEPA. The Plan would remove 5,190 acres of  
18 modeled habitat for least bittern and white-faced ibis in the study area in the near-term (5,140 acres  
19 of permanent loss, and 50 acres of temporary loss). These effects would result from the construction  
20 of the water conveyance facilities (CM1, 11 acres), and the implementation of other conservation  
21 measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4] 5,179 acres).

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
23 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
24 these ratios would indicate that 11 acres of habitat should be restored and 11 acres of habitat  
25 should be protected to compensate for the CM1 losses of 11 acres of least bittern and white-faced  
26 ibis habitat. The near-term effects of other conservation actions would remove 5,179 acres of  
27 modeled habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of  
28 least bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for  
29 restoration and 1:1 for protection).

30 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
31 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4  
32 in Chapter 3). These conservation actions are associated with CM4 and CM3 and would occur in the  
33 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
34 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be  
35 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*  
36 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that  
37 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed  
38 wetland would be protected and enhanced in CZ 11 and would benefit these species through the  
39 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
40 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
41 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at  
42 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat  
43 for least bittern and white-faced ibis. These Plan objectives represent performance standards for  
44 considering the effectiveness of restoration and protection actions. The acres of restoration and

1 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied  
2 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation  
3 measures.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
9 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
10 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
11 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
12 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
13 would be required to ensure that nests are detected and avoided.

#### 14 **Late Long-Term Timeframe**

15 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 13,119  
16 acres (13,069 acres of permanent loss, 50 acres of temporary loss) of least bittern and white-faced  
17 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
18 analyses of individual conservation measures. The Plan includes conservation commitments  
19 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
20 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
21 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
22 of managed wetland would be protected and enhanced in CZ 11.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
27 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
28 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
29 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
30 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
31 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
32 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,  
33 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
34 available to address this potential effect.

35 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these  
36 special status species under Alternative 1B would represent an adverse effect in the absence of  
37 other conservation actions. However, with the habitat protection and restoration associated with  
38 CM3, CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7,  
39 which would be in place throughout the construction period, the effects of habitat loss under on  
40 least bittern and white-faced ibis would not be adverse under Alternative 1B. Least bittern and  
41 white-faced ibis are not covered species under the BDCP, and the potential for mortality would be  
42 adverse without preconstruction surveys to ensure that nests are detected and avoided. Mitigation  
43 Measure BIO-75 would be available to address this adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
6 impacts of construction would be less than significant under CEQA. The Plan would remove 5,190  
7 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-term  
8 (5,140 acres of permanent loss, and 50 acres of temporary loss). These effects would result from the  
9 construction of the water conveyance facilities (CM1, 11 acres), and the implementation of other  
10 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]  
11 5,179 acres).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
13 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
14 these ratios would indicate that 11 acres of habitat should be restored and 11 acres of habitat  
15 should be protected to compensate for the CM1 losses of 11 acres of least bittern and white-faced  
16 ibis habitat. The near-term effects of other conservation actions would remove 5,179 acres of  
17 modeled habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of  
18 least bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for  
19 restoration and 1:1 for protection).

20 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent  
21 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3). These  
22 conservation actions are associated with CM4 and CM3 and would occur in the same timeframe as  
23 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
24 least bittern and white-faced ibis. The tidal freshwater emergent wetland would be restored in CZs  
25 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be  
26 restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
27 among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed wetland would be  
28 protected and enhanced in CZ 11 and would benefit these species through the enhancement of  
29 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists  
30 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-  
31 American bulrush plant associations (Objective MWNC1.1). In addition, at least 400 acres of nontidal  
32 marsh would be created, some of which would provide nesting habitat for least bittern and white-  
33 faced ibis. These Plan objectives represent performance standards for considering the effectiveness  
34 of restoration and protection actions. The acres of restoration and protection contained in the near-  
35 term Plan goals satisfy the typical mitigation that would be applied to the project-level effects of  
36 CM1, as well as mitigate the near-term effects of the other conservation measures.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
41 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
42 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
43 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
44 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP

1 to have a less-than-significant impact on individuals, preconstruction surveys would be required to  
2 ensure that nests were detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
3 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce the potential impact on  
4 nesting least bittern and white-faced ibis to a less-than-significant impact.

#### 5 **Late Long-Term Timeframe**

6 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 13,119  
7 acres (13,069 acres of permanent loss, 50 acres of temporary loss) of least bittern and white-faced  
8 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
9 analyses of individual conservation measures. The Plan includes conservation commitments  
10 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
11 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
12 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
13 of managed wetland would be protected and enhanced in CZ 11.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
19 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
20 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
21 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
22 to avoid having a significant impact on individuals, preconstruction surveys for noncovered avian  
23 species would be required to ensure that nests were detected and avoided. Mitigation Measure BIO-  
24 75 would reduce the potential impact on nesting least bittern and white-faced ibis and to a less-  
25 than-significant level.

26 Considering these protection and restoration provisions, which would provide acreages of new  
27 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction  
28 and restoration activities, and with the implementation of AMM1–AMM7 and Mitigation Measure  
29 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, the loss  
30 of habitat or direct mortality through implementation of Alternative 1B would not result in a  
31 substantial adverse effect through habitat modifications and would not substantially reduce the  
32 number or restrict the range of the species. Therefore, the loss of habitat or potential mortality  
33 under this alternative would have a less-than-significant impact on least bittern and white-faced  
34 ibis.

#### 35 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 36 **Disturbance of Nesting Birds**

37 See Mitigation Measure BIO-75 under Impact BIO-75.

#### 38 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical** 39 **Transmission Facilities**

40 New transmission lines would increase the risk for bird-power line strikes, which could result in  
41 injury or mortality of least bittern and white-faced ibis. The risk for bird-power line strikes would be  
42 minimized with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This measure



1 would ensure that conductor and ground lines are fitted with flight diverters in compliance with the  
2 best available practices, such as those specified in the USFWS Avian Protection Guidelines.

3 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
4 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
5 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would not have an adverse  
6 effect on least bittern and white-faced ibis.

7 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
8 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
9 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would have a less-than-  
10 significant impact on least bittern and white-faced ibis.

### 11 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced** 12 **Ibis**

13 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
14 with construction-related activities could result in temporary disturbances that affect least bittern  
15 and white-faced ibis use of modeled habitat. Construction noise above background noise levels  
16 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
17 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
18 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
19 which these noise levels could affect least bittern or white-faced ibis. Indirect effects associated with  
20 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and  
21 other ground-disturbing operations. Construction-related noise and visual disturbances could  
22 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
23 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
24 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
25 effects on active nests. The use of mechanical equipment during water conveyance facilities  
26 construction could cause the accidental release of petroleum or other contaminants that could affect  
27 these species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction*  
28 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills from  
29 occurring. The inadvertent discharge of sediment or excessive dust adjacent to least bittern and  
30 white-faced ibis could also have a negative effect on these species. AMM1–AMM7 would ensure that  
31 measures are in place to prevent runoff from the construction area and the negative effects of dust  
32 on wildlife adjacent to work areas.

33 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
34 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
35 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
36 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
37 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
38 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
39 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
40 associated with natural community and floodplain restoration could indirectly affect least bittern  
41 and white-faced ibis, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D,  
42 *Contaminants*).

43 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
44 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*

1 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
2 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
3 adaptive management as described in CM12 would be available to address the uncertainty of  
4 methylmercury levels in restored tidal marsh and potential impacts on least bittern and white-faced  
5 ibis.

6 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
7 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
8 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
9 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
10 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
11 classes within a species. In addition, the effect of selenium on a species can be confounded by  
12 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
13 2009).

14 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
15 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
16 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
17 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
18 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
19 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
20 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
21 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
22 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
23 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
24 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
25 levels of selenium have a higher risk of selenium toxicity.

26 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
27 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
28 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced  
29 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,  
30 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.  
31 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
32 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
33 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
34 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
35 long-term increases in selenium concentrations in water in the Delta under any alternative.  
36 However, it is difficult to determine whether the effects of potential increases in selenium  
37 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
38 lead to adverse effects on least bittern and white-faced ibis.

39 Because of the uncertainty that exists at this programmatic level of review, there could be a  
40 substantial effect on least bittern and white-faced ibis from increases in selenium associated with  
41 restoration activities. This effect would be addressed through the implementation of *AMM27*  
42 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
43 provide specific tidal habitat restoration design elements to reduce the potential for  
44 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
45 of selenium management to reduce selenium concentrations and/or bioaccumulation would be

1 evaluated separately for each restoration effort as part of design and implementation. This  
2 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
3 design schedule.

4 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
5 water conveyance facilities could have adverse effects on these species in the absence of other  
6 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this  
7 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
8 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of  
9 construction on active nests. Tidal habitat restoration could result in increased exposure of least  
10 bittern and white-faced ibis to selenium. This effect would be addressed through the  
11 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
12 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
13 bioavailability in tidal habitats.

14 Increased methylmercury associated with natural community and floodplain restoration could  
15 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in  
16 the BDCP, Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of  
17 methylmercury are harmful to the species, and the potential for increased exposure varies  
18 substantially within the study area. *CM12 Methylmercury Management* contains provisions for  
19 project-specific Mercury Management Plans. Site-specific restoration plans that address the creation  
20 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12  
21 would better inform potential adverse effects and address the uncertainty of methylmercury levels  
22 in restored tidal marsh in the study area. The site-specific planning phase of marsh restoration  
23 would be the appropriate place to assess the potential for risk of methylmercury exposure for least  
24 bittern and white-faced ibis, once site specific sampling and other information could be developed.

25 **CEQA Conclusion:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
26 water conveyance facilities could have a significant impact on these species. The incorporation of  
27 AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
28 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
29 impact to a less-than-significant level. Increased methylmercury associated with natural community  
30 and floodplain restoration could indirectly affect least bittern and white-faced ibis, via uptake in  
31 lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*). In addition, the  
32 potential mobilization or creation of methylmercury within the Plan Area varies with site-specific  
33 conditions and would need to be assessed at the project level. *CM12 Methylmercury Management*  
34 contains provisions for project-specific Mercury Management Plans. Tidal habitat restoration could  
35 result in increased exposure of least bittern and white-faced ibis to selenium. This effect would be  
36 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
37 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
38 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1B  
39 implementation would not have an significant impact on least bittern and white-faced ibis.

40 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
41 **Disturbance of Nesting Birds**

42 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**  
2 **Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 961-  
5 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-1B-50). However, no  
6 adverse effects of increased inundation frequency on nesting habitat are expected because wetland  
7 vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to frequency  
8 and inundation are within the tolerance of these vegetation types. Inundation would occur in the  
9 nonbreeding season and wetlands supporting habitat would not be expected to be affected by flood  
10 flows.

11 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on  
12 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo  
13 Bypass flooding regime, and changes to frequency and inundation are within the tolerance of these  
14 vegetation types.

15 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant  
16 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the  
17 existing Yolo Bypass flooding regime, and changes to frequency and inundation are within the  
18 tolerance of these vegetation types.

19 **Loggerhead Shrike**

20 This section describes the effects of Alternative 1B, including water conveyance facilities  
21 construction and implementation of other conservation components, on loggerhead shrike. Modeled  
22 habitat for loggerhead shrike includes both high-value and low-value modeled habitat. High-value  
23 habitat includes grassland, vernal pool complex and alkali seasonal wetland natural communities in  
24 addition to cultivated lands, including pasture and grain and hay crops. Low-value habitat includes  
25 row crops such as truck and berry crops and field crops which are not considered to be valuable  
26 habitat for the species but were included in the model as they may provide foraging opportunities.

27 Construction and restoration associated with Alternative 1B would result in both temporary and  
28 permanent losses of modeled habitat for loggerhead shrike as indicated in Table 12-1B-51.  
29 Construction and restoration associated with Alternative 1B conservation measures would include  
30 the following biological objectives over the term of the BDCP which would also benefit loggerhead  
31 shrike (BDCP Chapter 3, *Conservation Strategy*).

- 32 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
33 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
34 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 35 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 36 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
37 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 38 ● Increase prey availability and accessibility for grassland-foraging species (Objectives  
39 ASWNC2.4, VPNC2.5, and GNC2.4, associated with CM11).
- 40 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
41 other native wildlife species (Objective CLNC1.1, associated with CM3).

- Maintain and protect the small patches of important wildlife habitats associated with cultivated lands that occur in cultivated lands within the reserve system, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated with CM11).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for the species and implementation of AMM1-AMM7 and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1B-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	2,962	2,962	4,528	4,528	NA	NA
	Low-value	2,626	2,626	5,236	5,236	NA	NA
<b>Total Impacts CM1</b>		<b>5,588</b>	<b>5,588</b>	<b>9,764</b>	<b>9,764</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	High-value	5,151	25,252	165	633	894-2,460	3,470
	Low-value	1,874	17,353	0	526	1,227-1,858	4,375
<b>Total Impacts CM2-CM18</b>		<b>7,025</b>	<b>42,605</b>	<b>165</b>	<b>1,159</b>	<b>2,121-4,318</b>	<b>7,845</b>
<b>Total High-value</b>		<b>8,113</b>	<b>28,214</b>	<b>4,693</b>	<b>5,161</b>	<b>894-2,460</b>	<b>3,470</b>
<b>Total Low-value</b>		<b>4,500</b>	<b>19,979</b>	<b>5,236</b>	<b>5,762</b>	<b>1,227-1,858</b>	<b>4,375</b>
<b>TOTAL IMPACTS</b>		<b>12,613</b>	<b>48,193</b>	<b>9,929</b>	<b>10,923</b>	<b>2,121-4,318</b>	<b>7,845</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

### Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of Loggerhead Shrike

Alternative 1B conservation measures would result in the combined permanent loss or conversion and temporary loss of up to 59,116 acres of modeled habitat for loggerhead shrike (33,375 acres of which would be high-value habitat and 25,741 acres of which would be low-value habitat, Table 12-

1B-51). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), riparian restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), natural communities enhancement and management (CM11) and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244 acres) would result from CM4. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 15 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would result in the combined permanent and temporary loss of up to 15,172 acres of modeled loggerhead shrike habitat. This would be comprised of 7,490 acres of high-value habitat (2,962 permanent loss or conversion, 4,528 temporary loss or conversion) and 7,862 acres of low-value cultivated lands (2,626 permanent loss, 5,236 temporary loss) from CZ 4, CZ 5, CZ 6, CZ 7, and CZ 8. Impacts would primarily occur from the construction of the new forebay and associated borrow and spoil area in CZ 8. Other habitat losses would occur as a result of construction of the canal and associated borrow and spoil areas, and from the construction of the intakes in the north Delta. The largest impact from CM1 on loggerhead shrike would occur in CZ 8, where there are larger stands of ruderal and herbaceous vegetation and California annual grassland, which provides high-value habitat for the species. Approximately 685 acres of impact would be from the new forebay constructed south of the Clifton Court Forebay in CZ 8. Loggerhead shrikes nest in high abundance in these grasslands to the south and to the west of Clifton Court Forebay. Shrikes were detected using this area at a much higher rate than other grasslands and areas in the Delta during DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). The CM1 footprint overlaps with six loggerhead shrike occurrences, all in CZ 8. The construction of the new forebay overlaps with five occurrences and there is one occurrence that overlaps with the footprint of a temporary transmission line. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the establishment of no-disturbance buffers and would be available to address potential effects on loggerhead shrikes if they were to nest in or adjacent to construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations. Construction of the water conveyance facilities would occur in the near-term timeframe.
- 39 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement would result in the combined permanent and temporary loss of up to 1,274 acres of high-value loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10 years of Alternative 1B implementation.
- 45 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration (CM4) site preparation and inundation would permanently remove an estimated 20,880 acres of high-value loggerhead

1 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would  
2 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the  
3 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of  
4 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal  
5 restoration would directly impact and fragment grassland just north of Rio Vista in and around  
6 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses  
7 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo  
8 Bypass and on the northern fringes of Suisun Marsh.

- 9 ● *CM5 Seasonally Inundated Floodplain Restoration: Construction* of setback levees to restore  
10 seasonally inundated floodplain would permanently and temporarily remove approximately  
11 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These  
12 losses would be expected after the first 10 years of Alternative 1B implementation along the San  
13 Joaquin River and other major waterways in CZ 7.
- 14 ● *CM7 Riparian Natural Community Restoration:* Riparian restoration would permanently remove  
15 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and  
16 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat  
17 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of  
18 seasonal floodplain restoration through CM7.
- 19 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
20 *Complex Restoration:* Temporary construction-related disturbance of grassland habitat would  
21 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
22 would be restored after the construction periods. Grassland restoration would be implemented  
23 on agricultural lands that also provide habitat for loggerhead shrike and would result in the  
24 conversion of 1,849 acres of cultivated lands to high-value grassland.
- 25 ● *CM10 Nontidal Marsh Restoration:* Implementation of CM10 would result in the permanent  
26 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value  
27 loggerhead shrike habitat.
- 28 ● *CM11 Natural Communities Enhancement and Management:* A variety of habitat management  
29 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
30 habitats could result in localized ground disturbances that could temporarily remove small  
31 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
32 vegetation and road and other infrastructure maintenance activities, would be expected to have  
33 minor adverse effects on available habitat and would be expected to result in overall  
34 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
35 also include the construction of recreational-related facilities including trails, interpretive signs,  
36 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
37 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
38 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
39 of grassland habitat would be lost from the construction of trails and facilities.

40 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.  
41 If either species were to nest in the vicinity of a worksite, equipment operation could destroy  
42 nests, and noise and visual disturbances could lead to their abandonment, resulting in mortality  
43 of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*  
44 *and Avoid Disturbance of Nesting Birds*, would be available to address these adverse effects.

- 1       ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
2       value loggerhead shrike habitat for the development of a delta and longfin smelt conservation  
3       hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan  
4       implementation.
- 5       ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
6       water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
7       disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance  
8       activities would include vegetation management, levee and structure repair, and re-grading of  
9       roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,  
10      Mitigation Measure BIO-75, and conservation actions as described below.
- 11      ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
12      direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,  
13      because they would be expected to avoid contact with construction and other equipment. If  
14      either species were to nest in the construction area, construction-related activities, including  
15      equipment operation, noise and visual disturbances could destroy nests or lead to their  
16      abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
17      available to address these adverse effects.

18      The following paragraphs summarize the combined effects discussed above and describe other  
19      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
20      included.

#### 21      ***Near-Term Timeframe***

22      Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
23      the near-term BDCP conservation strategy has been evaluated to determine whether it would  
24      provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
25      effects of construction would not be adverse under NEPA. The Plan would remove 13,316 acres  
26      (8,412 permanent, 4,904 temporary) of high-value habitat for loggerhead shrike in the study area in  
27      the near-term. These effects would result from the construction of the water conveyance facilities  
28      (CM1, 7,490 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries  
29      Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain  
30      Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community  
31      Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural  
32      Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres). In  
33      addition, 9,761 acres (4,427 permanent, 5,333 temporary) of low-value habitat would be removed  
34      or converted in the near-term (CM1, 5,045 acres; *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal  
35      Natural Communities Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland  
36      Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,  
37      CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—  
38      1,898 acres).

39      The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
40      would be 2:1 protection of high-value habitat. Using this ratio would indicate that 14,980 acres  
41      should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
42      effects of other conservation actions would require 11,652 acres of protection to compensate for the  
43      loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
44      loss of high-value habitat). The loss of low-value habitat would not require mitigation because a



1 large proportion of the low-value habitat would result from the conversion and enhancement to  
2 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
3 quickly after completion of construction.

4 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
5 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
6 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
7 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
8 in the same timeframe as the construction and early restoration losses.

9 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
10 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
11 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
12 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
13 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the  
14 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement  
15 and Management*, insect prey populations would be increased on protected lands, enhancing the  
16 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
17 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
18 approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
19 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
20 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
21 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
22 along field borders and roadsides within protected cultivated lands would also provide high-value  
23 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
24 performance standards for considering the effectiveness of conservation actions.

25 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
26 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
27 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
28 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
29 timeframe would need to include suitable high-value crop types for loggerhead shrike to avoid an  
30 adverse effect of habitat loss from CM1. The conservation commitment is 7,572 acres short of  
31 meeting the compensation for other near-term effects on loggerhead shrike high-value habitat.  
32 Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike  
33 Habitat*, would be available to address the adverse effect of near-term high-value habitat loss by  
34 providing crop management requirements for CM1 compensation and requiring additional acreage  
35 compensation for the other near-term effects. The management and enhancement of cultivated  
36 lands including insect prey enhancement through CM3 and CM11, the protection of shrubs and  
37 establishment of hedgerows within protected cultivated lands would compensate for any potential  
38 effect from the loss of low-value loggerhead shrike foraging habitat.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2  
40 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention  
41 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and  
42 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
43 Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
44 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
45 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

1 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse  
2 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
3 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
4 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
5 adverse effect.

### 6 **Late Long-Term Timeframe**

7 Alternative 1B as a whole would result in the combined permanent of and temporary effects on  
8 34,631 acres of high-value habitat and 25,741 acres of low-value loggerhead shrike habitat over the  
9 term of the Plan. The locations of these losses are described above in the analyses of individual  
10 conservation measures. The Plan includes conservation commitments through *CM3 Natural*  
11 *Communities Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9*  
12 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore  
13 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150  
14 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide  
15 suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and  
16 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
17 protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
18 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
19 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,  
20 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current  
21 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,  
22 insect prey populations would be increased on protected lands, enhancing the foraging value of  
23 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that  
24 provide habitat for covered and other native wildlife species would provide approximately 48,625  
25 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is  
26 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and  
27 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the  
28 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides  
29 within protected cultivated lands would also provide high-value nesting habitat for loggerhead  
30 shrike (Objective SH2.2).

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
35 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
36 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
37 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
38 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
39 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
40 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
41 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

42 **NEPA Effects:** The loss of loggerhead shrike habitat and potential for mortality of this special-status  
43 species under Alternative 1B would represent an adverse effect in the absence of other conservation  
44 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and  
45 CM11, guided by biological goals and objectives and AMM1–AMM7, and with implementation of

1 Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike*  
2 *Habitat*, which would be available to guide the near-term protection and management of cultivated  
3 lands, the effects of habitat loss on loggerhead shrike under Alternative 1B would not be adverse.  
4 Loggerhead shrike is not a covered species under the BDCP, and the potential for mortality would be  
5 an adverse effect without preconstruction surveys to ensure that nests are detected and avoided.  
6 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
7 *Nesting Birds*, would be available to address this adverse effect.

8 **CEQA Conclusion:**

9 **Near-Term Timeframe**

10 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
11 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
12 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
13 effects of construction would be less than significant under CEQA. The Plan would remove 13,316  
14 acres (8,412 permanent, 4,904 temporary) of high-value habitat for loggerhead shrike in the study  
15 area in the near-term. These effects would result from the construction of the water conveyance  
16 facilities (CM1, 7,490 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
17 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
18 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
19 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*  
20 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826  
21 acres). In addition, 9,761 acres (4,427 permanent, 5,333 temporary) of low-value habitat would be  
22 removed or converted in the near-term (CM1, 5,045 acres; *CM2 Yolo Bypass Fisheries Enhancement*,  
23 *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*  
24 *Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
25 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*  
26 *Hatcheries*—1,898 acres).

27 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
28 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 14,980 acres  
29 should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
30 effects of other conservation actions would require 11,652 acres of protection to compensate for the  
31 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
32 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a  
33 large proportion of the low-value habitat would result from the conversion and enhancement to  
34 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
35 quickly after completion of construction.

36 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
37 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
38 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
39 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
40 in the same timeframe as the construction and early restoration losses.

41 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
42 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
43 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
44 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which

1 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce  
2 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
3 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
4 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
5 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
6 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
7 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
8 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
9 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
10 along field borders and roadsides within protected cultivated lands would also provide high-value  
11 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
12 performance standards for considering the effectiveness of conservation actions.

13 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
14 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
15 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
16 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
17 timeframe would need to include suitable high-value crop types for loggerhead shrike to avoid the  
18 significant impact of habitat loss from CM1. The conservation commitment is 7,572 acres short of  
19 meeting the mitigation needed to compensate for other near-term effects on loggerhead shrike high-  
20 value habitat. Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*  
21 *Loggerhead Shrike Habitat*, would address the significant impact of near-term high-value habitat loss  
22 by providing crop management requirements for CM1 compensation and requiring additional  
23 acreage compensation for the other near-term effects. With the implementation of Mitigation  
24 Measure BIO-138, the loss of high-value habitat would be reduced to a less-than-significant impact.  
25 With the management and enhancement of cultivated lands including insect prey enhancement  
26 through CM3 and CM11, the protection of shrubs and establishment of hedgerows within protected  
27 cultivated lands would compensate for any impact from the loss of low-value loggerhead shrike  
28 foraging habitat.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
34 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
35 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

36 The loggerhead shrike is not a covered species under the BDCP and in order to avoid an adverse  
37 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
38 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
39 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a  
40 less-than-significant level.

#### 41 **Late Long-Term Timeframe**

42 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 34,631  
43 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 21,047 acres  
44 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are

1 described above in the analyses of individual conservation measures. The Plan includes  
2 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM8*  
3 *Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland*  
4 *Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community,  
5 protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and  
6 protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species  
7 (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and  
8 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated  
9 with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and  
10 would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural  
11 communities which would create larger, more expansive patches of high-value habitat for  
12 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
13 *Natural Communities Enhancement and Management*, insect prey populations would be increased on  
14 protected lands, enhancing the foraging value of these natural communities (Objectives  
15 ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native  
16 wildlife species would provide approximately 48,625 acres of potential high-value habitat for  
17 loggerhead shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective  
18 CLNC1.3) to maintain and protect small patches of trees and shrubs within cultivated lands that  
19 would maintain foraging perches and nesting habitat for the species. The establishment of 20- to 30-  
20 foot-wide hedgerows along field borders and roadsides within protected cultivated lands would also  
21 provide high-value nesting habitat for loggerhead shrike (Objective SH2.2).

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
27 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
28 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
29 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
30 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
31 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
32 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-  
33 significant level.

34 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
35 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
36 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
37 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
38 *Birds*, and Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*  
39 *Loggerhead Shrike Habitat*, the loss of habitat or direct mortality through implementation of  
40 Alternative 1B would not result in a substantial adverse effect through habitat modifications and  
41 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of  
42 habitat or potential mortality under this alternative would have a less-than-significant impact on  
43 loggerhead shrike.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Mitigation Measure BIO-138: Compensate for the Near-term Loss of High-Value**  
5           **Loggerhead Shrike Habitat**

6           Because the BDCP does not include acreage commitments for the protection of crop types in the  
7           near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as  
8           pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the  
9           total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
10          2:1. Additional grassland protection, enhancement, and management may be substituted for the  
11          protection of high-value cultivated lands.

12          **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**  
13          **Facilities**

14          New transmission lines would increase the risk for bird-power line strikes, which could result in  
15          injury or mortality of loggerhead shrike. The risk for bird-power line strikes would be minimized  
16          with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This measure would ensure  
17          that conductor and ground lines are fitted with flight diverters in compliance with the best available  
18          practices, such as those specified in the USFWS Avian Protection Guidelines and would further  
19          ensure no adverse effect from electrical transmission facilities.

20          **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
21          could result in injury or mortality of loggerhead shrike. With the implementation of *AMM20 Greater*  
22          *Sandhill Crane* the effect of new transmission lines on loggerhead shrike would not be adverse.

23          **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
24          could result in injury or mortality of loggerhead shrike. With the incorporation of *AMM20 Greater*  
25          *Sandhill Crane* into the BDCP, new transmission lines would have a less-than-significant impact on  
26          loggerhead shrike.

27          **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

28          Noise and visual disturbances associated with construction-related activities could result in  
29          temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise  
30          above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge  
31          of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
32          *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to  
33          determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects  
34          associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
35          contouring, and other ground-disturbing operations. Construction-related noise and visual  
36          disturbances could disrupt nesting and foraging behaviors, and reduce the functions of suitable  
37          habitat which could result in an adverse effect on these species. Indirect effects from construction of  
38          the new forebay in CZ 8 could result in substantial effects on active loggerhead shrike nests. DHCCP  
39          surveys in 2009 detected 10 nest sites south-west of the Clifton Court Forebay (Appendix 12C, *2009*  
40          *to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*) and the large expanses of  
41          grassland in CZ 8 provide high-value nesting habitat for the species. Mitigation Measure BIO-75,

1 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
2 available to minimize adverse effects on active nests. The use of mechanical equipment during water  
3 conveyance facilities construction could cause the accidental release of petroleum or other  
4 contaminants that could affect these species or their prey in the surrounding habitat. AMM1–AMM7,  
5 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
6 likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to  
7 loggerhead shrike nesting habitat could also have a negative effect on these species. AMM1–AMM7  
8 would ensure that measures are in place to prevent runoff from the construction area and the  
9 negative effects of dust on wildlife adjacent to work areas.

10 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Plan implementation could have  
11 adverse effects on these species through the modification of habitat and potential for direct  
12 mortality. The loggerhead shrike is not a covered species under the BDCP and the potential for  
13 mortality would be adverse without preconstruction surveys to ensure that nests are detected and  
14 avoided. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting  
15 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to  
16 work areas. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction*  
17 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
18 adverse effect.

19 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 1B implementation  
20 could have a significant impact on these species. Construction of the new forebay in CZ 8 would have  
21 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton  
22 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and  
23 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
24 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

25 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
26 **Disturbance of Nesting Birds**

27 See Mitigation Measure BIO-75 under Impact BIO-75.

28 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**  
29 **Implementation of Conservation Components**

30 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
31 *Enhancement*) would increase the frequency and duration of inundation on 1,830–5,646 acres of  
32 modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of high-value  
33 habitat; Table 12-1B-51).

34 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
35 *Restoration*, could result in the periodic inundation of up to approximately 8,138 acres of modeled  
36 habitat (Table 12-1B-51), consisting of 3,823 acres of high-value and 4,315 acres of low-value  
37 habitat.

38 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
39 season due to periodic inundation. However, increased frequency and duration of inundation would  
40 occur during the nonbreeding season.

41 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead  
42 shrike from the modification of habitat. Reduced foraging habitat availability may be expected

1 during the fledgling period of the nesting season due to periodic inundation. However, increased  
2 frequency and duration of inundation would occur during the nonbreeding season.

3 **CEQA Conclusion:** Periodic inundation of floodplains would result in a less-than-significant impact  
4 on loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be  
5 expected during the fledgling period of the nesting season due to periodic inundation. However,  
6 increased frequency and duration of inundation would occur during the nonbreeding season.

### 7 **Song Sparrow “Modesto” Population**

8 This section describes the effects of Alternative 1B, including water conveyance facilities  
9 construction and implementation of other conservation components, on Modesto song sparrow. The  
10 Modesto song sparrow is common and ubiquitous throughout the study area, excluding CZ 11, and  
11 modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal  
12 freshwater emergent, and valley/foothill riparian vegetation communities.

13 Construction and restoration associated with Alternative 1B conservation measures would result in  
14 both temporary and permanent removal of Modesto song sparrow habitat in the quantities  
15 indicated in Table 12-1B-52. However, Alternative 1B is expected to have little impact on the  
16 population. Full implementation of Alternative 1B would include the following biological objectives  
17 over the term of the BDCP which would benefit Modesto song sparrow (BDCP Chapter 3,  
18 *Conservation Strategy*).

- 19 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
20 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
21 associated with CM7).
- 22 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
23 10 (Objective VFRNC1.2, associated with CM3).
- 24 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,  
25 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 26 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
27 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
28 associated with CM10)
- 29 ● Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,  
30 associated with CM10).
- 31 ● Increase prey availability and accessibility for grassland-foraging species (Objectives  
32 ASWNC2.4, VPNC2.5, and GNC2.4, associated with CM11).
- 33 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
34 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
35 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
36 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
37 with CM3).
- 38 ● Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
39 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated  
40 with CM3).



1 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
 2 implementation of AMM1–AMM7 and Mitigation Measure BIO-75, impacts on Modesto song  
 3 sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA  
 4 purposes.

5 **Table 12-1B-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative**  
 6 **1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	74	74	72	72	NA	NA
<b>Total Impacts CM1</b>		<b>74</b>	<b>74</b>	<b>72</b>	<b>72</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	2,444	3,253	133	169	81–158	284
<b>Total Impacts CM2–CM18</b>		<b>2,444</b>	<b>3,253</b>	<b>133</b>	<b>169</b>	<b>81–158</b>	<b>284</b>
<b>TOTAL IMPACTS</b>		<b>2,518</b>	<b>3,327</b>	<b>205</b>	<b>241</b>	<b>81–158</b>	<b>284</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

7

8 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**  
 9 **Sparrow**

10 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
 11 of up to 3,568 acres of modeled habitat for Modesto song sparrow (of which 3,327 acres would be a  
 12 permanent loss and 241 acres would be a temporary loss of habitat, Table 12-1B-52). Conservation  
 13 measures that would result in these losses are conveyance facilities and transmission line  
 14 construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass  
 15 improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat  
 16 enhancement and management activities (CM11), which would include ground disturbance and  
 17 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
 18 maintenance activities associated with the long-term operation of the water conveyance facilities  
 19 and other BDCP physical facilities could degrade or eliminate Modesto song sparrow modeled  
 20 habitat. Each of these individual activities is described below. A summary statement of the combined  
 21 impacts and NEPA effects, and a CEQA conclusion follows the individual conservation measure  
 22 discussions.

- 23 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would  
 24 result in the combined permanent and temporary loss of up to 146 acres of modeled Modesto  
 25 song sparrow habitat (74 acres of permanent loss, 72 acres of temporary loss) from CZ 4, CZ 5,

1 CZ 6, CZ 7, and CZ 8. The permanent footprint for CM1 overlaps with 19 occurrences of Modesto  
2 song sparrow. Fourteen occurrences would be impacted by the construction of the canal, and  
3 the other impacts would occur from the forebay, potential borrow or spoil sites, siphon work  
4 areas, the permanent transmission line footprint, and a reusable tunnel material storage area. In  
5 addition, the temporary footprint overlaps with 42 occurrences of song sparrow. Thirty-six of  
6 these occurrences would be impacted by siphon work areas, two would be impacted by intake  
7 work areas, and the other 4 occurrences would be impacted by a tunnel work area. Mitigation  
8 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
9 *Birds*, would require preconstruction surveys and the establishment of no-disturbance buffers  
10 and would be available to address adverse effects on nesting Modesto song sparrows. Refer to  
11 the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.  
12 Construction of the water conveyance facilities would occur within the first 10 years of  
13 Alternative 1B implementation.

- 14 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
15 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo  
16 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses  
17 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural  
18 community and managed wetland. The loss is expected to occur during the first 10 years of  
19 Alternative 1B implementation.
- 20 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
21 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled  
22 Modesto song sparrow habitat by the late long-term timeframe.
- 23 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
24 seasonally inundated floodplain would permanently and temporarily remove approximately 80  
25 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses  
26 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The  
27 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural  
28 community. These lands would be managed as a mosaic of seral stages, age classes, and plant  
29 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 30 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
31 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
32 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
33 activity would occur along waterway margins where riparian habitat stringers exist, including  
34 levees and channel banks. The improvements would occur within the study area on sections of  
35 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.  
36 Some of the restored riparian habitat in the channel margin would be expected to support  
37 nesting habitat for Modesto song sparrow.
- 38 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
39 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
40 habitats could result in localized ground disturbances that could temporarily remove small  
41 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
42 vegetation and road and other infrastructure maintenance activities, would be expected to have  
43 minor adverse effects on available habitat and would be expected to result in overall  
44 improvements to and maintenance of habitat values over the term of the BDCP.

1 Habitat management- and enhancement-related activities could affect Modesto song sparrow  
2 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could  
3 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in  
4 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
5 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these adverse  
6 effects.

- 7 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
8 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
9 disturbances that could affect Modesto song sparrow use of the surrounding habitat.  
10 Maintenance activities would include vegetation management, levee and structure repair, and  
11 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
12 AMM1–AMM7 and conservation actions as described below.
- 13 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
14 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,  
15 because they would be expected to avoid contact with construction and other equipment. If  
16 either species were to nest in the construction area, construction-related activities, including  
17 equipment operation, noise and visual disturbances could destroy nests or lead to their  
18 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
19 available to address these adverse effects.

20 The following paragraphs summarize the combined effects discussed above and describe other  
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
22 also included.

### 23 ***Near-Term Timeframe***

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would not be adverse under NEPA. The Plan would remove 2,723 acres of  
28 modeled habitat (2,518 permanent, 205 temporary) for Modesto song sparrow in the study area in  
29 the near-term. These effects would result from the construction of the water conveyance facilities  
30 (CM1, 146 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
31 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
32 *Restoration—2,577 acres*).

33 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
34 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
35 would indicate that 146 acres of suitable habitat should be restored/created and 146 acres should  
36 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term  
37 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore  
38 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow  
39 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for  
40 protection).

41 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
42 valley/foothill riparian natural community, restoring 8,850 acres of tidal freshwater emergent  
43 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the

1 Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with CM3, CM4, CM7,  
2 and CM10 and would occur in the same timeframe as the construction and early restoration losses,  
3 thereby avoiding adverse effects of habitat loss on Modesto song sparrow.

4 The majority of the riparian restoration acres would occur in CZ 7 as part of a reserve system with  
5 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
6 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and would provide suitable  
7 Modesto song sparrow nesting habitat. The tidal freshwater emergent wetland would be restored in  
8 CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be restored in a way that creates  
9 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
10 TFEWNC2.2). The nontidal marsh restoration would occur in CZs 2, 4, and/or 5, and the managed  
11 wetland restoration would occur in CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland  
12 restoration are associated with CM10 and would provide nesting habitat for Modesto song sparrow.

13 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
14 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
15 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
16 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
17 The management of protected grasslands to increase insect prey through techniques such as the  
18 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
19 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
20 standards for considering the effectiveness of conservation actions. The acres of restoration and  
21 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
22 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
23 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
28 *Material* and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
29 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
30 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

31 Modesto song sparrow is not a covered species under the BDCP. For the BDCP avoid an adverse  
32 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
33 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
34 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
35 adverse effect.

### 36 **Late Long-Term Timeframe**

37 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 3,568  
38 acres (3,327 acres of permanent loss, 241 acres of temporary loss) of modeled Modesto song  
39 sparrow habitat during the term of the Plan. The locations of these losses are described above in the  
40 analyses of individual conservation measures. The Plan includes conservation commitments  
41 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*  
42 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of  
43 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent  
44 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the

1 Plan Area (Table 3-4 in Chapter 3). Additional acres of valley/foothill riparian habitat would be  
2 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and  
3 slough channels in the Delta, some of which would be expected to support nesting habitat for  
4 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of  
5 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,  
6 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives  
7 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the  
8 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would  
9 provide suitable nesting habitat for Modesto song sparrow.

10 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
11 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
12 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
13 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
14 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
15 CM10 and would provide nesting habitat for Modesto song sparrow.

16 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
17 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
18 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
19 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
20 management of protected grasslands to increase insect prey through techniques such as the  
21 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
22 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
23 standards for considering the effectiveness of conservation actions. The acres of restoration and  
24 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
25 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
26 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
34 sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
35 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
36 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
37 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

38 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential for mortality of this special-  
39 status species under Alternative 1B would represent an adverse effect in the absence of other  
40 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,  
41 CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would  
42 be in place throughout the construction period, the effects of habitat loss on Modesto song sparrow  
43 under Alternative 1B would not be adverse. The Modesto song sparrow is not a covered species  
44 under the BDCP, and the potential for mortality would be an adverse effect without preconstruction

1 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be  
2 available to address this adverse effect.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 effects of construction would be less than significant under CEQA. The Plan would remove 2,723  
9 acres of modeled habitat (2,518 permanent, 205 temporary) for Modesto song sparrow in the study  
10 area in the near-term. These effects would result from the construction of the water conveyance  
11 facilities (CM1, 146 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
12 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*  
13 *Floodplain Restoration—2,577 acres*).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
15 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
16 would indicate that 146 acres of suitable habitat should be restored/created and 146 acres should  
17 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term  
18 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore  
19 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow  
20 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for  
21 protection).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
23 valley/foothill riparian natural community, restoring 8,850 acres of tidal freshwater emergent  
24 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
25 Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with CM3, CM4, CM7,  
26 and CM10 and would occur in the same timeframe as the construction and early restoration losses,  
27 thereby avoiding a significant impact of habitat loss on Modesto song sparrow.

28 The majority of the riparian restoration acres would occur in CZ 7 as part of a reserve system with  
29 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
30 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and would provide suitable  
31 Modesto song sparrow nesting habitat. The tidal freshwater emergent wetland would be restored in  
32 CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be restored in a way that creates  
33 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
34 TFEWNC2.2). The nontidal marsh restoration would occur in CZs 2, 4, and/or 5, and the managed  
35 wetland restoration would occur in CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland  
36 restoration are associated with CM10 and would provide nesting habitat for Modesto song sparrow.

37 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
38 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
39 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
40 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
41 The management of protected grasslands to increase insect prey through techniques such as the  
42 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
43 benefits to foraging Modesto song sparrows. These Plan objectives represent performance

1 standards for considering the effectiveness of conservation actions. The acres of restoration and  
2 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
3 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
4 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
10 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
11 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
12 sparrow is not a covered species under the BDCP. For the BDCP to have a less-than-significant  
13 impact on individuals, preconstruction surveys for noncovered avian species would be required to  
14 ensure that nests were detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
15 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-  
16 significant level.

### 17 **Late Long-Term Timeframe**

18 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 3,658  
19 acres (3,327 acres of permanent loss, 241 acres of temporary loss) of modeled Modesto song  
20 sparrow habitat during the term of the Plan. The locations of these losses are described above in the  
21 analyses of individual conservation measures. The Plan includes conservation commitments  
22 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*  
23 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of  
24 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent  
25 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the  
26 Plan Area (Table 3-4 in Chapter 3). Additional acres of valley/foothill riparian habitat would be  
27 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and  
28 slough channels in the Delta, some of which would be expected to support nesting habitat for  
29 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of  
30 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,  
31 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives  
32 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the  
33 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would  
34 provide suitable nesting habitat for Modesto song sparrow.

35 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
36 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
37 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
38 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
39 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
40 CM10 and would provide nesting habitat for Modesto song sparrow.

41 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
42 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
43 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
44 roadsides, which would provide additional habitat for the species (Objective SH2.2). The

1 management of protected grasslands to increase insect prey through techniques such as the  
2 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
3 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
4 standards for considering the effectiveness of conservation actions. The acres of restoration and  
5 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
6 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
7 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
13 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
14 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
15 sparrow is not a covered species under the BDCP. For the BDCP to minimize direct mortality of  
16 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
17 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
18 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant  
19 level.

20 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
21 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
22 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
23 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of  
24 Alternative 1B would not result in a substantial adverse effect through habitat modifications and  
25 would not substantially reduce the number or restrict the range of Modesto song sparrow.  
26 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-  
27 significant impact on Modesto song sparrow.

28 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
29 **Disturbance of Nesting Birds**

30 See Mitigation Measure BIO-75 under Impact BIO-75.

31 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**  
32 **Facilities**

33 New transmission lines would increase the risk for bird-power line strikes, which could result in  
34 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song  
35 sparrow and the incremental increased risk from the construction of new transmission lines is not  
36 expected to adversely affect the population.

37 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new  
38 transmission lines would not adversely affect the Modesto song sparrow population.

39 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of  
40 new transmission lines would have a less-than-significant impact on the Modesto song sparrow



1 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

2 **Indirect construction-related effects:** Noise and visual disturbances associated with construction-  
3 related activities could result in temporary disturbances that affect Modesto song sparrow use of  
4 modeled habitat. Construction noise above background noise levels (greater than 50 dBA) could  
5 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment  
6 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),  
7 although there are no available data to determine the extent to which these noise levels could affect  
8 Modesto song sparrow. Indirect effects associated with construction include noise, dust, and visual  
9 disturbance caused by grading, filling, contouring, and other ground-disturbing operations.  
10 Construction-related noise and visual disturbances could disrupt nesting and foraging behaviors,  
11 and reduce the functions of suitable habitat which could result in an adverse effect on these species.  
12 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
13 *Nesting Birds*, would be available to minimize adverse effects on active nests. The use of mechanical  
14 equipment during water conveyance construction could cause the accidental release of petroleum or  
15 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1–  
16 AMM7, including AMM2 *Construction Best Management Practices and Monitoring*, would minimize  
17 the likelihood of such spills from occurring. The inadvertent discharge of sediment or excessive dust  
18 adjacent to Modesto song sparrow could also have a negative effect on these species. AMM1–AMM7  
19 would ensure that measures are in place to prevent runoff from the construction area and the  
20 negative effects of dust on wildlife adjacent to work areas.

21 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
22 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
23 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
24 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
25 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
26 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
27 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
28 associated with natural community and floodplain restoration could indirectly affect Modesto song  
29 sparrow, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

30 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
31 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
32 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
33 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
34 adaptive management as described in CM12 would be available to address the uncertainty of  
35 methylmercury levels in restored tidal marsh and potential impacts on Modesto song sparrow.

36 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative  
37 1C water conveyance facilities could adversely affect individuals in the absence of other  
38 conservation actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of  
39 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
40 *Nesting Birds*, would minimize this adverse effect. The implementation of tidal natural  
41 communities restoration or floodplain restoration could result in increased exposure of Modesto  
42 song sparrow to methylmercury. However, it is unknown what concentrations of methylmercury are  
43 harmful to the species and the potential for increased exposure varies substantially within the study  
44 area. Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
45 monitoring and adaptive management as described in *CM12 Methylmercury Management* would

1 address the potential impacts of methylmercury levels in restored tidal marsh in the study area. The  
2 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
3 potential for risk of methylmercury exposure for Modesto song sparrow, once site specific sampling  
4 and other information could be developed.

5 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the water  
6 conveyance facilities could have a significant impact on these species. The incorporation of AMM1-  
7 AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
8 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
9 impact to a less-than-significant level. The implementation of tidal natural communities restoration  
10 or floodplain restoration could result in increased exposure of Modesto song sparrow to  
11 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
12 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
13 as monitoring and adaptive management as described in *CM12 Methylmercury Management* would  
14 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.

15 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
16 **Disturbance of Nesting Birds**

17 See Mitigation Measure BIO-75 under Impact BIO-75.

18 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**  
19 **Implementation of Conservation Components**

20 Flooding of the Yolo Bypass (CM2) would inundate 81-158 acres of modeled Modesto song sparrow  
21 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat  
22 availability would be expected during the fledgling period of the nesting season due to periodic  
23 inundation.

24 Based on hypothetical floodplain restoration, construction of setback levees from seasonally  
25 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately  
26 284 acres of Modesto song sparrow modeled habitat (Table 12-1B-52).

27 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to  
28 restore a more natural flood regime in support of wetland and riparian vegetation types that  
29 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during  
30 years when flooding extends into the nesting season (after March).

31 **NEPA Effects:** Periodic inundation would not result in an adverse effect on Modesto song sparrow  
32 because increased frequency and duration of inundation would be expected to restore a more  
33 natural flood regime in support of wetland and riparian vegetation types that provide Modesto song  
34 sparrow habitat.

35 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on Modesto song  
36 sparrow because increased frequency and duration of inundation would be expected to restore a  
37 more natural flood regime in support of wetland and riparian vegetation types that provide Modesto  
38 song sparrow habitat.

**Bank Swallow**

This section describes the effects of Alternative 1B, including construction and implementation of other conservation components, on bank swallow. Bank swallows nest in colonies along rivers, streams, or other water and require fine textured sandy soils in vertical banks to create their burrows. There is little suitable habitat for bank swallow in the study area because most of the erodible banks have been stabilized with of levee revetment. The placement of rock revetment prevents the lateral migration of rivers, removing the natural river process that creates vertical banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences 2007). An estimated 70-90% of the bank swallow population in California nests along the Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of the study area. However, there are three CNDDDB records of bank swallow colonies in the study area: two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island. Construction and restoration associated with Alternative 1B conservation measures would not result in the direct loss of modeled habitat for bank swallow (Table 12-1B-53). However, indirect effects of noise and visual disturbance resulting from *CM2 Yolo Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration* could impact bank swallow colonies if they were present near work areas. In addition, there is uncertainty with respect to how water flows upstream of the study area would affect bank swallow habitat.

As explained below, impacts on bank swallow would not be adverse for NEPA purposes and would be less than significant for CEQA purposes with the implementation of mitigation measures to monitor colonies and address the uncertainty of upstream operations on the species.

**Table 12-1B-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Breeding	0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**  
2 **Swallow**

3 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*  
4 *Enhancement*, and *CM4 Tidal Natural Communities Restoration*, including operation of earthmoving  
5 equipment and human activities at work sites, could result in temporary disturbances that cause  
6 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies  
7 with occupied burrows have been recorded in CZ 2 and CZ 5, and construction-related disturbances  
8 could result in an adverse effect on individuals. Various activities related to *CM11 Natural*  
9 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.

10 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank  
11 swallow colonies in the absence of other measures. Noise and visual disturbances could result in  
12 adverse effects on bank swallows if active colonies were present within 500 feet of work areas.  
13 Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on*  
14 *Bank Swallow Will Be Minimized*, would be available to address this adverse effect.

15 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a  
16 significant impact on bank swallow colonies in the absence of other measures. Noise and visual  
17 disturbances could result in significant impacts on bank swallows if active colonies were present  
18 within 500 feet of work areas. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow*  
19 *Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this  
20 impact to a less-than-significant level.

21 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**  
22 **Effects on Bank Swallow Will Be Minimized**

23 To the extent practicable, BDCP proponents will not construct conservation components during  
24 the bank swallow nesting season ( April 1 through August 31). If construction activities cannot  
25 be avoided during nesting season, a qualified biologist will conduct preconstruction surveys to  
26 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If  
27 no active nesting colonies are present, no further mitigation is required.

28 If active colonies are detected, BDCP proponents will establish a nondisturbance buffer  
29 (determined in coordination with CDFW and the Bank Swallow Technical Advisory Committee)  
30 around the colony during the breeding season. In addition, a qualified biologist will monitor any  
31 active colony within 500 feet of construction to ensure that construction activities do not affect  
32 nest success.

33 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**  
34 **on Bank Swallow**

35 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes  
36 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the  
37 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.

38 Because of this limited available habitat, and the reduction of natural river process, the species is  
39 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat  
40 creation, and 2) high flows during the breeding season. The potential impacts of changes in  
41 upstream flows during the breeding season on bank swallows are the flooding of active burrows and  
42 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin

1 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank  
2 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March when  
3 the swallows have nested and laid eggs in the burrows could result in the loss of nests. On the  
4 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with  
5 localized bank collapses that resulted in partial or complete colony failure (Stillwater Sciences  
6 2007).

7 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations  
8 on the Sacramento (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,  
9 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-  
10 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).  
11 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical  
12 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a  
13 description of the model). Alternative 1B would implement Operational Scenario A, which is the  
14 same Operational Scenario as Alternative 1A described below.

15 On the Sacramento River, at the Keswick and Red Bluff gauges, mean monthly flows under  
16 Alternative 1A would increase between April and August in all but wet years at the Keswick flow  
17 gauge (Table 1 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish*  
18 *Analysis*) and in dry and critical years at the gauge upstream of Red Bluff (Table 3 in Section 11C.1.1  
19 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*) which could lead to  
20 inundation of active colonies. However, the flows under Existing Conditions and the predicted flows  
21 in the late long-term without the project (NAA) also show increases in flows during the breeding  
22 season (April through August) in these water year types. Similar trends are shown for the Feather  
23 River (Table 15 in Section 11C.1.1 and Table 17 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model*  
24 *Results Utilized in the Fish Analysis*). In addition, at the Verona gauge on the Sacramento River in  
25 average, above normal, and wet water years, flows are predicted to be greater than 14,000 cfs  
26 during some months of the breeding season, which could lead to bank collapse events (Tables 1, 3,  
27 and 7 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*).  
28 However, flows of this height are recorded under Existing Conditions at this flow gauge and are also  
29 predicted for the late long-term time without the project (NAA).

30 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting  
31 bank swallow colonies during the breeding season, and predicted flows under Alternative 1B would  
32 not be substantially greater than under the No Action Alternative. However, because of the  
33 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
34 the potential for and magnitude of upstream impacts on bank swallow from changes in water  
35 facilities operations. Soil type, high winter flows, and low spring flows all contribute to successful  
36 nesting of bank swallow, and even moderate changes in seasonal flows could have an adverse effect  
37 on breeding success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and*  
38 *Evaluate Winter and Spring Flows Upstream of the Study Area*, would be available to address the  
39 uncertainty of potential adverse effects of upstream operations on bank swallow.

40 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be  
41 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative  
42 1B would not be substantially greater than under the No Action Alternative. However, because of the  
43 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
44 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.  
45 There are many variables that dictate suitable habitat for the species that cannot be clearly

1 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank  
2 swallow depending on soil type and location of current colonies. Implementation of Mitigation  
3 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*  
4 *the Study Area*, would address this potential significant impact and further determine if additional  
5 mitigation is required for bank swallow.

6 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**  
7 **Spring Flows Upstream of the Study Area**

8 To address the uncertainty of the impact of upstream spring flows on existing bank swallow  
9 habitat, DWR will monitor existing colonies upstream of the study area and collect habitat  
10 suitability data including soil type, number of active burrows per colony, and height of average  
11 burrows. In addition, to determine the degree to which reduced winter flows are contributing to  
12 habitat loss, DWR will quantify the winter flows required for river meander to create suitable  
13 habitat through lateral channel migration and bank resurfacing. If impacts of upstream flows on  
14 bank swallow are identified, further mitigation may be required after consultation with CDFW  
15 and the Bank Swallow Technical Advisory Committee. Recommended mitigation for changes in  
16 flow regimes associated with water conveyance includes conservation easements on currently  
17 occupied habitat or revetment removal projects to create habitat for bank swallow (Bank  
18 Swallow Technical Advisory Committee 2013).

19 **Yellow-Headed Blackbird**

20 This section describes the effects of Alternative 1B, including water conveyance facilities  
21 construction and implementation of other conservation components, on yellow-headed blackbird.  
22 The habitat model used to assess impacts on yellow-headed blackbird includes nesting habitat and  
23 foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural  
24 seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland. Modeled  
25 foraging habitat for yellow-headed blackbird consists of cultivated lands and noncultivated land  
26 cover types known to support abundant insect populations, including corn, pasture, and feedlots.

27 Construction and restoration associated with Alternative 1B conservation measures would result in  
28 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in  
29 Table 12-1B-54. Full implementation of Alternative 1B would include the following biological  
30 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (BDCP  
31 Chapter 3, *Conservation Strategy*).

- 32 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
33 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 34 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
35 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
36 associated with CM10).
- 37 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
38 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 39 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
40 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
41 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 42 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).

- 1       ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
2       complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 3       ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
4       lands that occur in cultivated lands within the reserve system, including isolated valley oak  
5       trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
6       water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
7       with CM3).
- 8       ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-1B-  
9       38) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).
- 10      ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
11      lands that occur in cultivated lands within the reserve system, including isolated valley oak  
12      trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
13      water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
14      with CM3).
- 15      ● Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4,  
16      associated with CM11).

17      As explained below, with the restoration or protection of these amounts of habitat, in addition to  
18      management activities to enhance habitats for the species and implementation of AMM1–AMM7,  
19      *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird  
20      would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative**  
2 **1B**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	19	19	35	35	NA	NA
	Foraging	2,964	2,964	4,582	4,582	NA	NA
<b>Total Impacts CM1</b>		<b>2,983</b>	<b>2,983</b>	<b>4,617</b>	<b>4,617</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	5,814	13,902	45	46	961-2,678	18
	Foraging	5,612	26,673	376	905	368-1,476	2,701
<b>Total Impacts CM2-CM18</b>		<b>11,426</b>	<b>40,575</b>	<b>421</b>	<b>951</b>	<b>1,495-4,394</b>	<b>2,719</b>
<b>Total Nesting</b>		<b>5,833</b>	<b>13,921</b>	<b>80</b>	<b>81</b>	961-2,678	18
<b>Total Foraging</b>		<b>8,576</b>	<b>29,637</b>	<b>4,958</b>	<b>5,487</b>	368-1,476	2,701
<b>TOTAL IMPACTS</b>		<b>14,409</b>	<b>43,558</b>	<b>5,038</b>	<b>5,568</b>	<b>1,495-4,394</b>	<b>2,719</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird**

5 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
6 of up to 49,126 acres of modeled habitat (14,002 acres of nesting habitat and 35,124 acres of  
7 foraging habitat)for yellow-headed blackbird (Table 12-1B-54). Conservation measures that would  
8 result in these losses are conveyance facilities and transmission line construction, and establishment  
9 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
10 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration  
11 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat  
12 enhancement and management activities (CM11) which include ground disturbance or removal of  
13 nonnative vegetation could result in local adverse habitat effects. In addition, maintenance activities  
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
15 facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these  
16 individual activities is described below. A summary statement of the combined impacts and NEPA  
17 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B water conveyance facilities  
19 would result in the combined permanent and temporary loss of up to 54 acres of yellow-headed  
20 blackbird nesting habitat (19 acres of permanent loss and 35 acres of temporary loss). In  
21 addition, 7,546 acres of foraging habitat would be removed (2,964 acres of permanent loss,



1 4,582 acres of temporary loss) (Table 12-1B-54). Impacts from CM1 would occur in the central  
2 delta in CZ 4, CZ 5, CZ 6, CZ 7, and CZ 8. There are no occurrences of yellow-headed blackbird  
3 that overlap with the construction footprint for CM1. However, Mitigation Measure BIO-75,  
4 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
5 require preconstruction surveys and the establishment of no-disturbance buffers and would be  
6 available to address potential effects on yellow-headed blackbirds if they were to nest in or  
7 adjacent to construction activities. Refer to the Terrestrial Biology Map Book for a detailed view  
8 of Alternative 1B construction locations.

- 9 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
10 would result in the combined permanent and temporary loss of up to 100 acres of nesting  
11 habitat (55 acres of permanent loss, 45 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
12 addition, 1,144 acres of foraging habitat would be removed (879 acres of permanent loss, 265  
13 acres of temporary loss). The loss is expected to occur during the first 10 years of Alternative 1B  
14 implementation.
- 15 ● *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation from CM4 would  
16 permanently remove or convert an estimated 13,847 acres of nesting habitat, which would  
17 consist primarily of managed wetland. In addition, 20,029 acres of foraging habitat would be  
18 lost or converted as a result of tidal restoration, over half of which would be from the loss or  
19 conversion of alfalfa. However, the resulting 65,000 acres of tidal natural communities would  
20 also provide habitat for the species, 24,000 acres of which would be tidal freshwater natural  
21 communities providing breeding habitat for yellow-headed blackbird.
- 22 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
23 seasonally inundated floodplain and riparian restoration actions would remove approximately 2  
24 acres of yellow-headed blackbird nesting habitat (1 acres of permanent loss, 1 acres of  
25 temporary loss) and 1,641 acres of foraging habitat (1,051 acres of permanent loss, 590 acres of  
26 temporary loss). These losses would be expected after the first 10 years of Alternative 1B  
27 implementation along the San Joaquin River and other major waterways in CZ 7.
- 28 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
29 approximately 509 acres of yellow-headed blackbird foraging habitat as part of tidal restoration  
30 and 2,033 acres as part of seasonal floodplain restoration through CM7.
- 31 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
32 implemented on agricultural lands and would result in the conversion of 926 acres of yellow-  
33 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,  
34 and 11. If agricultural lands supporting higher value foraging habitat than the restored  
35 grassland were removed, there would be a loss of white-tailed kite foraging habitat value. CM8  
36 would result in the restoration of 2,000 acres of grassland foraging habitat in the study area.
- 37 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh  
38 (CM10) would result in the permanent conversion of 988 acres of cultivated lands foraging  
39 habitat to nontidal marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may  
40 develop along the margins of restored nontidal marsh and restoration would also provide  
41 foraging habitat for the species.
- 42 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
43 enhancement-related activities could disturb yellow-headed blackbird nests if they were  
44 present near work sites. A variety of habitat management actions included in CM11 that are

1 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
2 disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat  
3 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,  
4 such as removal of nonnative vegetation and road and other infrastructure maintenance, would  
5 be expected to have minor effects on available yellow-headed blackbird habitat. These effects  
6 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
7 AMM1–AMM7. CM11 would also include the construction of recreational-related facilities  
8 including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and*  
9 *Associated Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic  
10 areas, bathrooms, etc. would be placed on existing, disturbed areas when and where possible.  
11 However, approximately 50 acres of grassland foraging habitat would be lost from the  
12 construction of trails and facilities.

- 13 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
14 yellow-headed blackbird foraging habitat for the development of a delta and longfin smelt  
15 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan  
16 implementation.
- 17 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
18 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
19 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.  
20 Maintenance activities would include vegetation management, levee and structure repair, and  
21 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
22 AMMs and conservation actions as described below.
- 23 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
24 direct mortality of adult or fledged yellow-headed blackbird if they were present in the Plan  
25 Area, because they would be expected to avoid contact with construction and other equipment.  
26 If yellow-headed blackbird were to nest in the construction area, construction-related activities,  
27 including equipment operation, noise and visual disturbances could destroy nests or lead to  
28 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,  
29 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
30 available to address these adverse effects on yellow-headed blackbird.

31 The following paragraphs summarize the combined effects discussed above and describe other  
32 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
33 included.

#### 34 ***Near-Term Timeframe***

35 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
36 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
37 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
38 effects of construction would not be adverse under NEPA. The Plan would remove 5,913 acres  
39 (5,833 acres of permanent loss, 80 acres of temporary loss) of yellow-headed blackbird nesting  
40 habitat in the study area in the near-term. These effects would result from the construction of the  
41 water conveyance facilities (CM1, 54 acres), and implementing other conservation measures (CM2  
42 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
43 *Inundated Floodplain Restoration*—5,859 acres). In addition, 13,534 acres of yellow-headed  
44 blackbird foraging habitat would be removed or converted in the near-term (CM1, 7,546 acres; CM2

1 *Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally*  
2 *Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland*  
3 *Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation*  
4 *Hatcheries—5,988 acres).*

5 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
6 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
7 of foraging habitat. Using these ratios would indicate that 54 acres of nesting habitat should be  
8 restored/created and 54 acres should be protected to compensate for the CM1 losses of yellow-  
9 headed blackbird nesting habitat. In addition, 7,546 acres of foraging habitat should be protected to  
10 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
11 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
12 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
13 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

14 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
15 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
16 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
17 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
18 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3).  
19 These conservation actions are associated with CM3, CM4, CM8, and CM10 and would occur in the  
20 same timeframe as the construction and early restoration losses.

21 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
22 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
23 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
24 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
25 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
26 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
27 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
28 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
29 created, some of which would provide nesting habitat for the species.

30 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
31 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
32 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
33 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
34 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
35 abundance would also be increased on protected lands, enhancing the foraging value of these  
36 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
37 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
38 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
39 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
40 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
41 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

42 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife  
43 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
44 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
45 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the

1 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
2 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The yellow-headed  
10 blackbird is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
11 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
12 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
13 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

#### 14 **Late Long-Term Timeframe**

15 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
16 of modeled foraging habitat for yellow-headed blackbird. Alternative 1B as a whole would result in  
17 the permanent loss of and temporary effects on 13,948 acres of potential nesting habitat (17% of the  
18 potential nesting habitat in the study area) and the loss or conversion of 35,124 acres of foraging  
19 habitat (11% of the foraging habitat in the study area). The locations of these losses are described  
20 above in the analyses of individual conservation measures.

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
22 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*  
23 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
24 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
25 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
26 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
27 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
28 habitat for native wildlife species (Table 3-4 in Chapter 3).

29 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
30 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
31 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
32 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
33 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
34 or marsh where the predominant vegetation consists of invasive species such as perennial  
35 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
36 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
37 which would provide nesting habitat for the species.

38 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
39 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
40 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
41 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
42 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
43 abundance would also be increased on protected lands, enhancing the foraging value of these  
44 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would

1 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
2 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
3 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
4 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
5 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
6 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
7 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
8 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,  
9 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-  
10 headed blackbird.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
16 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
17 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

18 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
19 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
20 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
21 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
22 address this adverse effect.

23 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential for direct mortality of this  
24 special-status species associated with Alternative 1B would represent an adverse effect in the  
25 absence of other conservation actions. However, with habitat protection and restoration associated  
26 with CM3, CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–  
27 AMM7, which would be in place throughout the construction phase, the effects of habitat loss would  
28 not be adverse under Alternative 1B. The yellow-headed blackbird is not a covered species under  
29 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
30 noncovered avian species would be required to ensure that nests are detected and avoided.  
31 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
32 *Nesting Birds*, would be available to address this adverse effect.

### 33 **CEQA Conclusion:**

#### 34 **Near-Term Timeframe**

35 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
36 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
37 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
38 effects of construction would be less than significant under CEQA. The Plan would remove 5,913  
39 acres (5,833 acres of permanent loss, 80 acres of temporary loss) of yellow-headed blackbird  
40 nesting habitat in the study area in the near-term. These effects would result from the construction  
41 of the water conveyance facilities (CM1, 54 acres), and implementing other conservation measures  
42 (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5*  
43 *Seasonally Inundated Floodplain Restoration*—5,859 acres). In addition, 13,534 acres of yellow-  
44 headed blackbird foraging habitat would be removed or converted in the near-term (CM1, 7,546

1 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5  
2 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8  
3 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation  
4 Hatcheries—5,988 acres).

5 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
6 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
7 of foraging habitat. Using these ratios would indicate that 54 acres of nesting habitat should be  
8 restored/created and 54 acres should be protected to compensate for the CM1 losses of yellow-  
9 headed blackbird nesting habitat. In addition, 7,546 acres of foraging habitat should be protected to  
10 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
11 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
12 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
13 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

14 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
15 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
16 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
17 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
18 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3).  
19 These conservation actions are associated with CM3, CM4, CM8, and CM10 and would occur in the  
20 same timeframe as the construction and early restoration losses.

21 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
22 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
23 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
24 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
25 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
26 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
27 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
28 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
29 created, some of which would provide nesting habitat for the species.

30 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
31 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
32 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
33 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
34 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
35 abundance would also be increased on protected lands, enhancing the foraging value of these  
36 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
37 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
38 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
39 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
40 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
41 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

42 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife  
43 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
44 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
45 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the

1 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
2 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

10 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP and in order to  
11 avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species would  
12 be required to ensure that nests are detected and avoided. The implementation of Mitigation  
13 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
14 *Birds*, would reduce the potential impact on nesting yellow-headed blackbird to a less-than-  
15 significant level.

### 16 **Late Long-Term Timeframe**

17 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
18 of modeled foraging habitat for yellow-headed blackbird. Alternative 1B as a whole would result in  
19 the permanent loss of and temporary effects on 13,948 acres of potential nesting habitat (17% of the  
20 potential nesting habitat in the study area) and the loss or conversion of 35,124 acres of foraging  
21 habitat (11% of the foraging habitat in the study area). The locations of these losses are described  
22 above in the analyses of individual conservation measures.

23 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
24 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*  
25 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
26 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
27 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
28 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
29 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
30 habitat for native wildlife species (Table 3-4 in Chapter 3).

31 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
32 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
33 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
34 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
35 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
36 or marsh where the predominant vegetation consists of invasive species such as perennial  
37 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
38 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
39 which would provide nesting habitat for the species.

40 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
41 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
42 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
43 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would

1 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
2 abundance would also be increased on protected lands, enhancing the foraging value of these  
3 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
4 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
5 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
6 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
7 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
8 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
9 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
10 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
11 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,  
12 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-  
13 headed blackbird.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
19 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
20 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

21 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
22 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
23 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
24 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
25 impact to a less-than-significant level.

26 Considering Alternative 1B's protection and restoration provisions, which would provide acreages  
27 of new or enhanced habitat in amounts necessary to compensate for habitat lost to construction and  
28 restoration activities, and with the implementation of AMM1-AMM7 and Mitigation Measure BIO-  
29 75, the loss of habitat or direct mortality through implementation of Alternative 1B would not result  
30 in a substantial adverse effect through habitat modifications and would not substantially reduce the  
31 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
32 under this alternative would have a less-than-significant impact on yellow-headed blackbird.

### 33 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 34 **Disturbance of Nesting Birds**

35 See Mitigation Measure BIO-75 under Impact BIO-75.

### 36 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission** 37 **Facilities**

38 New transmission lines would increase the risk for bird-power line strikes, which could result in  
39 injury or mortality of yellow-headed blackbirds. Transmission line poles and towers also provide  
40 perching substrate for raptors, which could result in increased predation pressure on yellow-headed  
41 blackbirds. The existing network of transmission lines in the Plan Area currently poses this risk for  
42 yellow-headed blackbirds, and any incremental risk associated with the new transmission line  
43 corridors would be expected to be low. *AMM20 Greater Sandhill Crane* would further minimize the



1 risk for bird-power line strikes with the installation of flight diverters on new and selected existing  
2 transmission lines.

3 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
4 could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
5 also provide perching substrate for raptors, which could result in increased predation pressure on  
6 yellow-headed blackbirds. The existing network of transmission lines in the Plan Area currently  
7 poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
8 transmission line corridors would not be expected to have an adverse effect on yellow-headed  
9 blackbirds. *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power line  
10 strikes.

11 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
12 could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
13 also provide perching substrate for raptors, which could result in increased predation pressure on  
14 yellow-headed blackbirds. The existing network of transmission lines in the Plan Area currently  
15 poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
16 transmission line corridors would have a less-than-significant impact on yellow-headed blackbird.  
17 *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power line strikes.

#### 18 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

19 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
20 with construction-related activities could result in temporary disturbances that affect yellow-  
21 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater  
22 than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP  
23 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
24 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
25 noise levels could affect yellow-headed blackbird. Indirect effects associated with construction  
26 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
27 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and  
28 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse  
29 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
30 *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.  
31 The use of mechanical equipment during water conveyance construction could cause the accidental  
32 release of petroleum or other contaminants that could affect the species in the surrounding habitat.  
33 *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would  
34 minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment or  
35 excessive dust adjacent to yellow-headed blackbird habitat could also have a negative effect on the  
36 species. *AMM1-AMM7* would ensure that measures are in place to prevent runoff from the  
37 construction area and the negative effects of dust on wildlife adjacent to work areas.

38 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
39 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and  
40 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
41 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
42 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
43 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
44 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity

1 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
2 specific effects. Increased methylmercury associated with natural community and floodplain  
3 restoration could indirectly affect yellow-headed blackbird, via uptake in lower trophic levels (as  
4 described in the BDCP, Appendix 5.D, *Contaminants*).

5 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
6 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
7 *Management* includes provisions for project-specific Mercury Management Plans. Site-specific  
8 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
9 adaptive management as described in CM12 would be available to address the uncertainty of  
10 methylmercury levels in restored tidal marsh and potential effects on yellow-headed blackbird.

11 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
12 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,  
13 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
14 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed  
15 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
16 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse  
17 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
18 communities restoration or floodplain restoration could result in increased exposure of yellow-  
19 headed blackbird to methylmercury, in restored tidal areas. However, it is unknown what  
20 concentrations of methylmercury are harmful to these species and the potential for increased  
21 exposure varies substantially within the study area. Site-specific restoration plans that address the  
22 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
23 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
24 area and better inform potential effects on yellow-headed blackbird. The site-specific planning  
25 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
26 methylmercury exposure for yellow-headed blackbird, once site specific sampling and other  
27 information could be developed.

28 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
29 operations and maintenance of the water conveyance facilities under Alternative 1B would have a  
30 less-than-significant impact on yellow-headed blackbird with the implementation of Mitigation  
31 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
32 *Birds*, and AMM1–AMM7. The implementation of tidal natural communities restoration or floodplain  
33 restoration could result in increased exposure of yellow-headed blackbird to methylmercury.  
34 However, it is unknown what concentrations of methylmercury are harmful to this species. Site-  
35 specific restoration plans that address the creation and mobilization of mercury, as well as  
36 monitoring and adaptive management as described in CM12, would better inform potential impacts  
37 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area.

38 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
39 **Disturbance of Nesting Birds**

40 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**  
2 **as a Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–  
4 2,678 acres of foraging habitat (Table 12-1B-54). Based on hypothetical floodplain restoration,  
5 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
6 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding  
7 habitat (Table 12-1B-54) resulting in the temporary loss of these habitats. Foraging yellow-headed  
8 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is  
9 inundated, as they do under the current flooding regime. However, this inundation could reduce the  
10 availability of nesting habitat during years when flooding extends into the nesting season (past  
11 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is  
12 expected to restore a more natural flood regime in support of wetland and riparian vegetation types  
13 that support nesting habitat.

14 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
15 foraging habitat for yellow-headed blackbird. Periodic inundation would not have an adverse effect  
16 on yellow-headed blackbird because inundation is expected to take place outside of the breeding  
17 season, and, although foraging habitat may be temporarily unavailable, birds would be expected to  
18 move to adjacent foraging habitat.

19 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
20 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-  
21 significant impact on yellow-headed blackbird because inundation is expected to take place outside  
22 of the breeding season, and, although foraging habitat would be temporarily unavailable, birds  
23 would be expected to move to adjacent foraging habitat.

24 **Riparian Brush Rabbit**

25 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation  
26 associations within the valley/foothill riparian natural community and adjacent grasslands. The  
27 vegetation associations were selected based on a review of understory and overstory composition  
28 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

29 Just until recently, the only known naturally occurring populations of riparian brush rabbits were  
30 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland  
31 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of  
32 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-  
33 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry  
34 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury  
35 pers. comm.). This is only the 2<sup>nd</sup> naturally occurring population documented outside of Caswell  
36 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush  
37 rabbit, to the extent information was available, included size and degree of isolation of habitat  
38 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

39 Construction and restoration associated with Alternative 1B conservation measures would result in  
40 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table  
41 12-1B-55. Full implementation of Alternative 1B would also include biological objectives over the  
42 term of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The  
43 conservation strategy for the riparian brush rabbit, with conservation principles involves

1 protecting, restoring or creating, and maintaining habitat and corridors near the largest remaining  
2 fragments of habitat and extant populations; providing high-water refugia from flooding; and  
3 managing feral predators (dogs and cats) in areas occupied by the species. The conservation  
4 measures that would be implemented to achieve the biological goals and objectives are summarized  
5 below.

- 6 • Provide a range of elevations in restored floodplains that transition from frequently flooded  
7 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
8 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
9 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 10 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
11 between existing conservation lands (Objective L1.6, associated with CM3).
- 12 • Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
13 recolonization of vegetation, desirable natural community vegetation is regenerated, and  
14 structural diversity is promoted, or implement management actions that mimic those natural  
15 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 16 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
17 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
18 associated with CM3–CM8, and CM11).
- 19 • Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
20 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
21 with CM3 and CM7).
- 22 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
23 (Objective VFRNC1.2, associated with CM3).
- 24 • Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
25 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
26 with CM5, CM7, and CM11).
- 27 • Of the 750 acres of protected valley/foothill riparian natural community protected under  
28 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined  
29 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous  
30 with occupied habitat (Objective RBR1.1, associated with 3).
- 31 • Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,  
32 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are  
33 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat  
34 (Objective RBR1.2, associated with CM3, CM7, and CM11).
- 35 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
36 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian  
37 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or  
38 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat  
39 (Objective 1.3, associated with CM3, CM7, and CM11).
- 40 • Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit  
41 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,  
42 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that  
43 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).

- 1 • In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control  
2 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,  
3 associated with CM11).
- 4 • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of  
5 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side  
6 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for  
7 riparian brush rabbit (Objective RBR1.6, associated with CM3 and CM8).

8 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
9 implementation of the AMMs to reduce potential effects, impacts on riparian brush rabbit would not  
10 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-1B-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 1B**  
12 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	5	5	5	5	NA	NA
	Grassland	137	137	30	30	NA	NA
<b>Total Impacts CM1</b>		<b>142</b>	<b>142</b>	<b>35</b>	<b>35</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>106</b>	<b>0</b>	<b>55</b>	<b>0</b>	<b>687</b>
<b>TOTAL IMPACTS</b>		<b>142</b>	<b>248</b>	<b>35</b>	<b>90</b>	<b>0</b>	<b>687</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

13

14 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**  
15 **Rabbit**

16 Alternative 1B conservation measures would result in the permanent loss of up to 107 acres of  
17 riparian habitat and 231 acres of associated grassland habitat for the riparian brush rabbit in the  
18 study area (Table 12-1B-55). The hypothetical footprint for levee construction under CM5, overlaps  
19 with one occurrence record for riparian brush rabbit, south of the Interstate 5/Interstate 205  
20 interchange. Conservation measures resulting in permanent habitat loss include conveyance  
21 facilities construction (CM1), tidal natural communities restoration (CM4), and floodplain  
22 restoration (CM5). Each of these individual activities is described below. A summary statement of

1 the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation  
2 measure discussions.

- 3 ● *CM1 Water Facilities and Operation*: Development of Alternative 1B water conveyance facilities  
4 would result in the permanent removal of approximately 5 acres of riparian habitat and  
5 137 acres of associated grassland habitat and in the temporary removal of 5 acres of riparian  
6 habitat and 30 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-1B-55). The  
7 riparian habitat that would be removed is of low value for the riparian brush rabbit as it  
8 consists of several small, isolated patches surrounded by agricultural lands northeast of Clifton  
9 Court Forebay. The associated grasslands are also of low value for the species: They consist of  
10 long, linear strips that abut riparian habitat, but extend several miles from the riparian habitat  
11 and, therefore, provide few if any opportunities for adjacent cover. Trapping efforts conducted  
12 for the riparian brush rabbit in this area were negative (BDCP Appendix 3.E, *Conservation*  
13 *Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology  
14 Map Book for a detailed view of Alternative 1B construction locations.
- 15 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
16 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres  
17 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The  
18 riparian habitat that would be removed consists of relatively small and isolated patches along  
19 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts  
20 Island areas, and several small patches along the San Joaquin River. The habitat that would be  
21 removed is not adjacent to any existing conserved lands, and is several miles north and northeast  
22 of the northernmost riparian brush rabbit record located northeast of Paradise Cut (Williams et  
23 al. 2002). Although the final footprint for tidal natural communities restoration would differ  
24 from the hypothetical footprint, *AMM25 Riparian Woodrat and Riparian Brush Rabbit* requires  
25 that tidal natural communities restoration avoid removal of any habitat occupied by the riparian  
26 brush rabbit.
- 27 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
28 restoration would result in the permanent removal of approximately 43 acres of riparian habitat  
29 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late  
30 longterm. Levee construction would also result in the temporary removal of 35 acre riparian  
31 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are  
32 considered temporary, five years to several decades may be required for ecological succession  
33 to occur and for restored riparian habitat to replace the function of habitat that has been  
34 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small  
35 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous  
36 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for  
37 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the  
38 Interstate 5/Interstate 205 interchange.

39 Although the final floodplain restoration design would differ from the hypothetical footprint  
40 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the  
41 general area of the riparian brush rabbit population. Implementation of adaptive management  
42 described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed  
43 does not exceed maximum allowable habitat loss for this species.

- 44 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
45 actions included in CM11 that are designed to enhance wildlife values in BDCP protected

1 habitats may result in localized ground disturbances that could temporarily remove small  
2 amounts of riparian brush rabbit habitat. Enhancement and management actions in riparian  
3 brush rabbit habitat within the reserve system may include invasive plant removal, planting and  
4 maintaining vegetation to improve and sustain habitat characteristics for the species, and  
5 creating and maintaining flood refugia. These activities are expected to have minor adverse  
6 effects on available riparian brush rabbit habitat and are expected to result in overall  
7 improvements to and maintenance of riparian brush rabbit habitat values over the term of the  
8 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
9 and minimized through the AMMs listed below.

10 Passive recreation in the reserve system could result in disturbance of individual riparian brush  
11 rabbits foraging in the ecotone between riparian and adjacent open habitats. However, *AMM37,*  
12 *Recreation* limits trail development adjacent to riparian corridors within the range of the  
13 riparian brush rabbit. With this minimization measure in place, recreation related effects on the  
14 riparian brush rabbit are expected to be minimal.

- 15 ● Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to  
16 adversely affect the riparian brush rabbit because the species is not expected to occur in the  
17 vicinity of proposed facilities.
- 18 ● Injury and direct mortality: Water conveyance facility construction is not likely to result in  
19 injury or mortality of individual riparian brush rabbits because the species is not likely to be  
20 present in the areas that would be affected by this activity, based on live trapping results (BDCP  
21 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal  
22 natural communities restoration would not result in injury or mortality of the riparian brush  
23 rabbit because tidal natural communities restoration projects would be designed to avoid  
24 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and  
25 relocated as described in AMM25 (see BDCP Appendix 3.C, *Avoidance and Minimization*  
26 *Measures*). Activities associated with construction of setback levees for floodplain restoration  
27 could result in injury or mortality of riparian brush rabbits: however, preconstruction surveys,  
28 construction monitoring, and other measures would be implemented to avoid and minimize  
29 injury or mortality of this species during construction (AMM25).

30 The following paragraphs summarize the combined effects discussed above and describe other  
31 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
32 also included.

### 33 ***Near-Term Timeframe***

34 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
35 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
36 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
37 effects of construction would not be adverse under NEPA.

38 Alternative 1B would result in permanent and temporary effects combined on 10 acres of riparian  
39 habitat and 167 acres of grassland habitat for riparian brush rabbit in the near-term as a result of  
40 construction of the water conveyance facilities (CM1). The habitat would be lost in the  
41 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush  
42 rabbit habitat would occur be an area unlikely to be occupied by the species. Habitat loss in CZ 7, in  
43 areas known or likely to be occupied, would occur during the early long-term and late long-term

1 timeframes. Riparian restoration would be phased to minimize temporal habitat loss. There would  
2 be no near-term losses from CM2–CM18.

3 Typical NEPA project-level mitigation ratios for these natural communities that would be affected  
4 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
5 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
6 community, and 2:1 for protection of grassland. Using these ratios would indicate that 10 acres of  
7 riparian habitat should be restored, 10 acres of riparian habitat should be protected, and 334 acres  
8 of grassland should be protected for riparian brush rabbit for near-term losses.

9 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and  
10 an unknown number of associated acres of grassland and protection of 750 acres of riparian  
11 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
12 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would  
13 inform the near-term protection and restoration efforts. The natural community restoration and  
14 protection activities are expected to be concluded during the first 10 years of plan implementation,  
15 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for  
16 NEPA purposes. These commitments are more than sufficient to support the conclusion that the  
17 near-term effects of Alternative 1B would be not be adverse under NEPA, because the number of  
18 acres required to meet the typical ratios described above would be only 10 acres of riparian habitat  
19 restored, 10 acres of riparian habitat protected, and 334 acres of grassland protected.

20 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
25 *Communities*, *AMM25 Riparian Woodrat and Riparian Brush Rabbit*, and *AMM37 Recreation*. These  
26 AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats and  
27 species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
28 Appendix 3.C, *Avoidance and Minimization Measures*.

### 29 **Late Long-Term Timeframe**

30 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
31 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1B a  
32 whole would result in permanent and temporary effects combined on 107 acres of modeled riparian  
33 habitat and 231 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and  
34 8% of the riparian and grassland modeled habitat in CZ 6, CZ 7, and CZ 8. Habitat lost in CZ 6 and CZ  
35 8 is fragmented, isolated, and unlikely to support the species. Habitat would also be lost in areas in  
36 CZ 7 that provide high-value habitat for the species.

37 The BDCP would restore at least 5,000 acres and protect at least 750 acres of valley/foothill riparian  
38 natural community, a portion of which is expected to consist of suitable riparian brush rabbit  
39 habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of  
40 early- to midsuccessional riparian natural community be conserved in CZ 7, in areas that are  
41 adjacent to or that facilitate connectivity with existing occupied or potentially occupied habitat. This  
42 would consist of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored  
43 habitat. The 800 acres to be conserved would consist of early successional riparian vegetation  
44 suitable for riparian brush rabbit. The conserved habitat would also be part of a larger, more



1 contiguous, and less patchy area of protected and restored riparian natural community than what  
2 currently exists in CZ 7 and would be contiguous with existing modeled riparian brush rabbit  
3 habitat. The species-specific objectives further require that the 200 acres of protected riparian  
4 habitat (Objective RBR1.4) and at least 300 acres of the restored riparian habitat (Objective RBR1.3)  
5 meet more specific ecological requirements of riparian brush rabbit, including large patches of  
6 dense riparian brush; ecotonal edges that transition from brush species to grasses and forbs,  
7 scaffolding plants to support vines that grow above flood levels; a tree canopy that is open, if  
8 present; and high-ground refugia from flooding. In protected riparian areas that are occupied by  
9 riparian brush rabbit, nonnative predators that are known to prey on riparian brush rabbit would  
10 be monitored and controlled (Objective RBR1.5).

11 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the Plan  
12 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
13 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
14 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
15 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
16 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
17 on the landward side of levees adjacent to restored floodplain would be restored or protected as  
18 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

19 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
20 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to  
21 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
22 flooded areas would provide refuge for the riparian brush rabbit during most years. The BDCP  
23 would also create and maintain mounds, levee sections, or other high areas in restored and  
24 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia  
25 for the riparian brush rabbit (Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*  
26 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush  
27 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that  
28 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

29 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
30 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
31 restoration of valley/foothill riparian and grassland that could overlap with the species model,  
32 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat  
33 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could  
34 overlap with the species model and would result in the protection of 200 acres of riparian and 317  
35 acres of grassland riparian brush rabbit modeled habitat.

36 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat under Alternative 1B would  
37 not be adverse because there is little likelihood of riparian brush rabbits being present and the  
38 BDCP has committed to protecting and restoring the acreage required to meet the typical mitigation  
39 ratios described above. In the late long-term, the losses of riparian brush rabbit riparian and  
40 grassland habitat associated with Alternative 1B, in the absence of other conservation actions,  
41 would represent an adverse effect as a result of habitat modification and potential direct mortality  
42 of a special-status species. However, with habitat protection and restoration associated with the  
43 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
44 AMM10, AMM25, and AMM37, the effects of Alternative 1B as a whole on riparian brush rabbit  
45 would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
4 term BDCP conservation strategy has been evaluated to determine whether it would provide  
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
6 construction would be less than significant under CEQA.

7 Alternative 1B would result in permanent and temporary effects combined on 10 acres of riparian  
8 habitat and 167 acres of grassland habitat for riparian brush rabbit in the near-term as a result of  
9 construction of the water conveyance facilities (CM1). The habitat would be lost in the  
10 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush  
11 rabbit habitat would occur be an area unlikely to be occupied by the species. Habitat loss in CZ 7, in  
12 areas known or likely to be occupied, would occur during the early long-term and late long-term  
13 timeframes. Riparian restoration would be phased to minimize temporal habitat loss. There would  
14 be no near-term losses from CM2–CM18.

15 Typical NEPA project-level mitigation ratios for these natural communities that would be affected  
16 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
17 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
18 community, and 2:1 for protection of grassland. Using these ratios would indicate that 10 acres of  
19 riparian habitat should be restored, 10 acres of riparian habitat should be protected, and 334 acres  
20 of grassland should be protected for riparian brush rabbit for near-term losses.

21 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and  
22 an unknown number of associated acres of grassland and protection of 750 acres of riparian  
23 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
24 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1-RBR1.6) would  
25 inform the near-term protection and restoration efforts. The natural community restoration and  
26 protection activities are expected to be concluded during the first 10 years of plan implementation,  
27 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for  
28 CEQA purposes. These commitments are more than sufficient to support the conclusion that the  
29 near-term effects of Alternative 1B would be less than significant under CEQA, because the number  
30 of acres required to meet the typical ratios described above would be only 10 acres of riparian  
31 habitat protected, 10 acres of riparian habitat restored, and 334 acres of grassland habitat

32 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.  
33 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats  
34 and species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
35 Appendix 3.C, *Avoidance and Minimization Measures*.

36 **Late Long-Term Timeframe**

37 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
38 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1B would  
39 result in permanent and temporary effects combined on 105 acres of modeled riparian habitat and  
40 244 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and CZ 8. Habitat lost  
41 in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species. Habitat would also be  
42 lost in areas in CZ 7 that provide high-value habitat for the species.

1 The BDCP would restore at least 5,000 acres and protect at least 750 acres of valley/foothill riparian  
2 natural community, a portion of which is expected to consist of suitable riparian brush rabbit  
3 habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of  
4 early- to midsuccessional riparian natural community be conserved in CZ 7, in areas that are  
5 adjacent to or that facilitate connectivity with existing occupied or potentially occupied habitat. This  
6 would consist of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored  
7 habitat. The 800 acres to be conserved would consist of early successional riparian vegetation  
8 suitable for riparian brush rabbit. The conserved habitat would also be part of a larger, more  
9 contiguous, and less patchy area of protected and restored riparian natural community than what  
10 currently exists in CZ 7 and would be contiguous with existing modeled riparian brush rabbit  
11 habitat. The species-specific objectives further require that the 200 acres of protected riparian  
12 habitat (Objective RBR1.4) and at least 300 acres of the restored riparian habitat (Objective RBR1.3)  
13 meet more specific ecological requirements of riparian brush rabbit, including large patches of  
14 dense riparian brush; ecotonal edges that transition from brush species to grasses and forbs,  
15 scaffolding plants to support vines that grow above flood levels; a tree canopy that is open, if  
16 present; and high-ground refugia from flooding. In protected riparian areas that are occupied by  
17 riparian brush rabbit, nonnative predators that are known to prey on riparian brush rabbit would  
18 be monitored and controlled (RBR1.5).

19 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP  
20 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
21 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
22 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
23 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
24 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
25 on the landward side of levees adjacent to restored floodplain would be restored or protected as  
26 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

27 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
28 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to  
29 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
30 flooded areas would provide refuge for the riparian brush rabbit during most years. The BDCP  
31 would also create and maintain mounds, levee sections, or other high areas in restored and  
32 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia  
33 for the riparian brush rabbit (Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*  
34 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush  
35 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that  
36 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

37 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
38 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
39 restoration of valley/foothill riparian and grassland that could overlap with the species model,  
40 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat  
41 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could  
42 overlap with the species model and would result in the protection of 200 acres of riparian and 317  
43 acres of grassland riparian brush rabbit modeled habitat.

44 Only a small proportion of the habitat losses would be considered occupied and of high value. The  
45 Alternative 1B conservation measures provide for large acreages of riparian brush rabbit riparian

1 and grassland habitats to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,  
2 AMM25, and AMM37, which are directed at minimizing or avoiding potential effects during  
3 construction and operation of the conservation measures. Overall, the BDCP would provide a  
4 substantial net benefit to the riparian brush rabbit through the increase in available habitat and  
5 habitat in protected status. These protected areas would be managed and monitored to support the  
6 species.

7 Considering the habitat restoration and protection associated with CM3, CM7, CM8 and CM11,  
8 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,  
9 the temporary and permanent losses of riparian and grassland habitat and potential for direct  
10 mortality of riparian brush rabbit as a result of implementing Alternative 1B would not represent a  
11 substantial adverse effect through habitat modifications and would not substantially reduce the  
12 number or restrict the range of the species. The loss of habitat and potential mortality of riparian  
13 brush rabbits would not be a significant impact under CEQA.

#### 14 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

15 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
16 modeled riparian brush rabbit riparian habitat and associated grassland habitat in the study area.  
17 These construction activities would include water conveyance construction, tidal natural  
18 communities restoration construction, construction and subsequent maintenance of transmission  
19 lines, and construction of setback levees. Construction would occur in CZ 8 where there is suitable  
20 habitat for the species but surveys by ESRP did not indicate the species is present in this area;  
21 therefore, the potential for adverse noise and visual effects from conveyance facility construction  
22 would be minimal. Tidal natural communities restoration construction would potentially affect  
23 adjacent riparian habitat and associated grassland habitat for this species: however, adverse effects  
24 on the species are unlikely because tidal natural communities restoration projects would be sited to  
25 avoid areas occupied by riparian brush rabbit. The activity most likely to result in noise and visual  
26 disturbance to riparian brush rabbit is the construction of setback levees for floodplain restoration,  
27 which would take place in CZ 7, where the species is known to occur. The use of mechanical  
28 equipment during construction might cause the accidental release of petroleum or other  
29 contaminants that would affect the riparian brush rabbit in adjacent habitat, if the species is present.

30 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative  
31 1B would avoid the potential for substantial adverse effects on riparian brush rabbits, either  
32 indirectly or through habitat modifications or result in a substantial reduction in numbers or a  
33 restriction in the range of riparian brush rabbits. Therefore, indirect effects of Alternative 1B would  
34 not have an adverse effect on riparian brush rabbit.

35 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
36 as construction-related noise and visual disturbances could affect riparian brush rabbit in riparian  
37 and grassland habitats. The use of mechanical equipment during construction could cause the  
38 accidental release of petroleum or other contaminants that could affect riparian brush rabbit. The  
39 inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat could  
40 also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10, AMM25,  
41 and AMM37 as part of Alternative 1B, the BDCP would avoid the potential for substantial adverse  
42 effects on riparian brush rabbits, either indirectly or through habitat modifications and would not  
43 result in a substantial reduction in numbers or a restriction in the range of riparian brush rabbits.  
44 Indirect effects of Alternative 1B would have a less-than-significant impact on riparian brush rabbit.

1 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of**  
2 **Implementation of Conservation Components**

3 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in  
4 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate  
5 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres  
6 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the  
7 riparian brush rabbit. The area between existing levees that would be breached and the newly  
8 constructed setback levees would be inundated through seasonal flooding. The potentially  
9 inundated areas consist of high-value habitat for the species: although they consist of small patches  
10 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous  
11 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would  
12 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to  
13 higher elevation areas that flood infrequently (e.g., every 10 years or more).

14 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian  
15 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of  
16 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that  
17 would be seasonally flooded based on the hypothetical restoration footprint.

18 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of  
19 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic  
20 inundation on the riparian brush rabbit would be minimized through construction and maintenance  
21 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing  
22 Alternative 1B, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to  
23 result in substantial adverse effects on riparian brush rabbit, either directly or through habitat  
24 modifications and would not result in a substantial reduction in numbers or a restriction in the  
25 range of riparian brush rabbits. Therefore, Alternative 1B would not adversely affect the species.

26 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small  
27 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of  
28 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,  
29 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
30 flooding promotes the germination and establishment of many native riparian plants. In the late  
31 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to  
32 the establishment of high-value habitat for covered riparian species, such as the riparian brush  
33 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the  
34 edges of seasonally inundated habitat.

35 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through  
36 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.  
37 Therefore, implementing Alternative 1B, including AMM1–AMM7, AMM10, AMM25, and AMM37,  
38 would not be expected to result in substantial adverse effects on riparian brush rabbit, either  
39 directly or through habitat modifications and would not result in a substantial reduction in numbers  
40 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland  
41 habitat for riparian brush rabbit under Alternative 1B would have a less-than-significant impact on  
42 the species.

## 1 Riparian Woodrat

2 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances  
3 from the valley/foothill riparian natural community, geographically constrained to the south Delta  
4 portion of the BDCP area in CZ 7, south of SR 4 and Old River Pipeline along the Stanislaus, San  
5 Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise Cut,  
6 Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded from the  
7 riparian woodrat habitat model due to a lack of trees or riparian corridors that were too narrow.  
8 Factors considered in assessing the value of affected habitat for the riparian woodrat, to the extent  
9 that information is available, include habitat patch size and connectivity.

10 The riparian woodrat is not known to occur in the study area. The only verified extant population of  
11 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell  
12 Memorial State Park along the Stanislaus River (Williams and Basey 1986:1–112; 1993). Riparian  
13 woodrat may occur in small patches of valley oak riparian forest along the San Joaquin River from  
14 the southern tip of the study area north to approximately the Interstate 5 overcrossing near  
15 Lathrop. Construction and restoration associated with Alternative 1B conservation measures would  
16 result in both temporary and permanent losses of riparian woodrat modeled habitat as indicated in  
17 Table 12-1B-56. Tidal habitat restoration, floodplain restoration, and protection and management of  
18 natural communities could affect modeled riparian woodrat habitat. However, because the species is  
19 not known to occur in the study area it is not expected to be affected by BDCP actions unless the  
20 species were to establish in the study area over the term of the BDCP. Full implementation of  
21 Alternative 1B would also include biological objectives over the term of the BDCP to benefit the  
22 riparian woodrat (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the  
23 riparian woodrat involves providing opportunities for population expansion into the Plan Area from  
24 adjacent lands to the south and southeast. The strategy focuses on restoring and maintaining  
25 suitable habitat at the southernmost end of CZ 7, providing connectivity with existing populations to  
26 the south and southeast, and creating and maintaining flood refugia. This conservation approach is  
27 consistent with the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles  
28 (BDCP, Appendix 3.E). The conservation measures that would be implemented to achieve the  
29 biological goals and objectives are summarized below.

- 30 ● Provide a range of elevations in restored floodplains that transition from frequently flooded  
31 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
32 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
33 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 34 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
35 between existing conservation lands (Objective L1.6, associated with CM3).
- 36 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
37 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
38 associated with CM3-CM8, and CM11).
- 39 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres  
40 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with  
41 CM3 and CM7).
- 42 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
43 (Objective VFRNC1.2, associated with CM3).

- 1 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
2 overlap among vegetation components and over adjacent riverine channels, freshwater  
3 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 4 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
5 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the  
6 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak  
7 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially  
8 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).
- 9 • Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored  
10 under Objective RW1.1 through the retention, construction, and/or restoration of high-ground  
11 habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective  
12 RW1.2, associated with CM7 and CM11).

13 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
14 implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be  
15 adverse for NEPA purposes and would be less than significant for CEQA purposes.

16 **Table 12-1B-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 1B**  
17 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	0	0	1	1	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	0	51	0	33	0	203
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>51</b>	<b>0</b>	<b>33</b>	<b>0</b>	<b>203</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>51</b>	<b>1</b>	<b>34</b>	<b>0</b>	<b>203</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

18

19 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

- 20 • Alternative 1B conservation measures would result in the permanent loss of up to 51 acres of  
21 habitat (2% of the habitat in the study area) and temporary loss of up to 34 acres of habitat for  
22 riparian woodrat (Table 12-1B-56). Construction of Alternative 1B water conveyance facilities  
23 (CM1), tidal natural communities restoration (CM4) and seasonally inundated floodplain  
24 restoration (CM5) would remove habitat. Each of these individual activities is described below.  
25 A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow

1 the individual conservation measure discussions *CM1 Water Facilities and Operation*:  
2 Development of Alternative 1B water conveyance facilities would result in the temporary  
3 removal of approximately 1 acre of modeled habitat for riparian woodrat in CZ 8 (Table 12-1B-  
4 56). The modeled habitat that would be removed is of low value for the riparian woodrat as it  
5 consists of several small, isolated patches surrounded by agricultural lands northeast of Clifton  
6 Court Forebay. Trapping efforts conducted for the riparian woodrat in this area were negative  
7 (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian*  
8 *Woodrat*). Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B  
9 construction locations.

- 10 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
11 inundation would permanently remove approximately 10 acres of modeled habitat for the  
12 riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch  
13 surrounded by agricultural lands, and the species has a relatively low likelihood of being present  
14 in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*  
15 require that tidal natural communities restoration avoid removal of any habitat occupied by the  
16 riparian woodrat as determined by presence/absence surveys. Because the estimates of habitat  
17 loss due to tidal inundation are based on projections of where restoration may occur, actual  
18 habitat loss is expected to be lower because sites would be selected to minimize effects on  
19 riparian woodrat.
- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
21 restoration would result in the permanent removal of approximately 41 acres of modeled  
22 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is  
23 moderate. Although the habitat consists of small patches and narrow bands of riparian  
24 vegetation and no riparian woodrats have been detected in CZ 7, the riparian patches are in proximity  
25 to each other along the San Joaquin River. There are two species occurrences immediately south  
26 of CZ 7, one of which is less than 1.5 mile from the southernmost patch of riparian habitat  
27 potentially affected by levee construction.

28 The final floodplain restoration design would differ from the hypothetical footprint used for this  
29 effects analysis. However, monitoring and adaptive management described in CM11 and AMM25  
30 would ensure that modeled habitat permanently removed does not exceed the amount  
31 estimated based on the hypothetical footprint. Habitat loss is expected to be lower than 41 acres  
32 because sites would be selected and restoration designed to minimize effects on the riparian  
33 woodrat. If natural flooding is insufficient to maintain appropriate riparian woodrat vegetation  
34 structure, the vegetation would be actively managed to provide suitable habitat structure as  
35 described in CM11 Natural Communities Enhancement and Management.

36 Levee construction would also result in the temporary removal of 33 acres of modeled habitat  
37 for the riparian woodrat. Although the effects are considered temporary, 5 years to several  
38 decades may be required for ecological succession to occur and for restored riparian habitat to  
39 replace the function of habitat that has been affected.

- 40 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
41 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
42 habitats may result in localized ground disturbances that could temporarily remove small  
43 amounts of riparian woodrat habitat. Enhancement and management actions in riparian  
44 woodrat habitat within the reserve system may include invasive plant removal, planting and  
45 maintaining vegetation to improve and sustain habitat characteristics for the species, and



1 creating and maintaining flood refugia. These activities are expected to have minor adverse  
2 effects on available riparian woodrat habitat and are expected to result in overall improvements  
3 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects  
4 cannot be quantified, but are expected to be minimal and would be avoided and minimized  
5 through the AMMs listed below.

- 6 ● Operations and maintenance: The only ongoing effects on the riparian woodrat are those  
7 potentially resulting from habitat enhancement and management activities. Enhancement and  
8 management actions in riparian woodrat habitat within the reserve system may include invasive  
9 plant removal, planting and maintaining vegetation to improve and sustain habitat  
10 characteristics for the species, and creating and maintaining flood refugia. These activities may  
11 result in harassment of riparian woodrats through noise and visual disturbance which would be  
12 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.
- 13 ● Injury and direct mortality: Water conveyance facility construction is not likely to result in  
14 injury or mortality of individual riparian woodrats because the species is not likely to be present  
15 in the areas that would be affected by this activity, based on live trapping results (BDCP  
16 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal  
17 natural communities restoration would not result in injury or mortality of the riparian woodrats  
18 because tidal natural communities restoration projects would be designed to avoid occupied  
19 riparian woodrat habitat and if that is not possible to trap and relocate the species (AMM25).  
20 Activities associated with construction of setback levees for floodplain restoration could result  
21 in injury or mortality of riparian woodrats: however, preconstruction surveys, construction  
22 monitoring, and other measures would be implemented under AMM25 to avoid and minimize  
23 injury or mortality of this species during construction, as described in Appendix 3.C. If occupied  
24 riparian woodrat habitat cannot be avoided, mortality would be avoided through  
25 implementation of a trapping and relocation program. The program would be developed in  
26 coordination with USFWS, and relocation would be to a site approved by USFWS prior to  
27 construction activities.

28 The following paragraphs summarize the combined effects discussed above and describe other  
29 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
30 also included.

### 31 ***Near-Term Timeframe***

32 Because water conveyance facilities construction is being evaluated at the project level, the near-  
33 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
34 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
35 not be adverse under NEPA. Alternative 1B would result in temporary effects on 1 acre of modeled  
36 habitat for riparian woodrat in the near-term as a result of construction of the water conveyance  
37 facilities (CM1). The habitat would be lost in the valley/foothill riparian. All the near-term loss of  
38 riparian woodrat habitat would result from CM1 conveyance facility construction in CZ 8, and would  
39 occur in an area not likely to be occupied by the species. Habitat loss in CZ 7, in areas known or  
40 likely to be occupied, would occur during the early long-term and late long-term implementation  
41 periods. Riparian restoration would be phased to minimize temporal habitat loss. There would be no  
42 near-term losses from CM2–CM18.

43 Typical NEPA project-level mitigation ratios for these natural communities that would be affected  
44 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the

1 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
2 community. Using these ratios would indicate that 1 acre of riparian habitat should be restored and  
3 1 acre of riparian habitat should be protected for riparian woodrat for near-term losses.

4 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)  
5 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,  
6 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term  
7 protection and restoration efforts. The natural community restoration and protection activities are  
8 expected to be concluded during the first 10 years of plan implementation, which is close enough in  
9 time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These  
10 commitments are more than sufficient to support the conclusion that the near-term effects of  
11 Alternative 1B would not be adverse under NEPA, because only 1 acre of modeled habitat would be  
12 temporarily affected and there is only limited potential for minor adverse effects on woodrats or its  
13 habitat from implementation of CM11.

14 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
15 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training, AMM2*  
16 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
17 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material (RTM), and*  
19 *Dredged Material, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*  
20 *Communities, and AMM25 Riparian Woodrat and Riparian Brush Rabbit. The AMMs are described in*  
21 *detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

#### 22 **Late Long-Term Timeframe**

23 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.  
24 Alternative 1B as a whole would result in the permanent loss of and temporary removal of 85 acres  
25 of modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is  
26 considered occupied.

27 The BDCP would restore at least 5,000 acres and protect at least 750 acres of valley/foothill riparian  
28 natural community, a portion of which is expected to consist of suitable riparian brush rabbit  
29 habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of  
30 riparian habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow  
31 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing  
32 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be  
33 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural  
34 community than what currently exists in CZ 7 and would be contiguous with existing modeled  
35 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of  
36 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,  
37 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural  
38 community would provide riparian woodrat habitat proportional to the amount of modeled habitat  
39 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area  
40 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community  
41 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is  
42 comparable to or of higher value than existing modeled grassland habitat. All riparian protection  
43 would occur during the near-term period, to offset early riparian losses.

1 The BDCP would also create and maintain mounds, levee sections, or other high areas in restored  
2 and protected riparian areas (Objective RW1.2) that are designed specifically to provide flood  
3 refugia for the riparian woodrat (Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit*  
4 *and Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood  
5 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)  
6 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat  
7 during most years.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
9 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
10 restoration of valley/foothill riparian that could overlap with the species model, would result in the  
11 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of  
12 valley/foothill riparian could overlap with the species model and would result in the protection of  
13 90 acres riparian woodrat modeled habitat.

14 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
15 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
16 opportunities for northward expansion of the species into the study area. Implementation of  
17 Alternative 1B conservation measures is not expected to adversely affect the riparian woodrat for  
18 the following reasons.

- 19 ● There are no riparian woodrat occurrences in the Plan Area.
- 20 ● The habitat that would be removed consists of small patches that are of moderate value for the  
21 species.
- 22 ● The habitat that would be removed permanently is a small proportion of the total habitat in the  
23 Plan Area (2%).
- 24 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of  
25 riparian woodrats, and to minimize loss of occupied habitat.
- 26 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not  
27 adversely affect any riparian woodrats that occupy restored floodplains.

28 **NEPA Effects:** Alternative 1B would provide a substantial benefit to the riparian woodrat through  
29 the net increase of available habitat and a net increase of habitat in protected status. These  
30 protected areas would be managed and monitored to support the species. The habitat that would be  
31 affected by Alternative 1B is currently unoccupied, and habitat removal is not expected to result in a  
32 discernible change in the abundance or distribution of riparian woodrats if they occupy study area  
33 habitats. Should the species be detected in the study area, implementation of AMM1-AMM7,  
34 AMM10, and AMM25 would avoid and minimize the effects of conservation component construction  
35 and implementation. Therefore, the loss of habitat and potential mortality of individuals under  
36 Alternative 1B would not have an adverse effect on riparian woodrat.

### 37 **CEQA Conclusion:**

#### 38 **Near-Term Timeframe**

39 Because water conveyance facilities construction is being evaluated at the project level, the near-  
40 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
41 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
42 be less than significant for CEQA purposes.

1 Alternative 1B would result in temporary effects on 1 acre s of modeled habitat for riparian woodrat  
2 in the near-term as a result of construction of the water conveyance facilities (CM1). The habitat  
3 would be lost in the valley/foothill riparian. All the near-term loss of riparian woodrat habitat would  
4 result from CM1 conveyance facility construction, and would occur in CZ 8 in an area not likely to be  
5 occupied by the species. Habitat loss in CZ 7, in areas known or likely to be occupied, would occur  
6 during the early long-term and late long-term implementation periods. Riparian restoration would  
7 be phased to minimize temporal habitat loss. There would be no near-term losses from CM2–CM18.

8 Typical CEQA project-level mitigation ratios for these natural communities that would be affected  
9 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the  
10 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
11 community. Using these ratios would indicate that 1 acre of riparian habitat should be restored and  
12 1 acre of riparian habitat should be protected for riparian woodrat for near-term losses.

13 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)  
14 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,  
15 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term  
16 protection and restoration efforts. The natural community restoration and protection activities are  
17 expected to be concluded during the first 10 years of plan implementation, which is close enough in  
18 time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes.

19 These commitments are more than sufficient to support the conclusion that the near-term effects of  
20 Alternative 1B would not be significant under CEQA, because only 1 acre of modeled habitat would  
21 be temporarily affected and there is only limited potential for minor adverse effects on woodrats or  
22 its habitat from implementation of CM11.

23 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
24 minimized through the BDCP's commitment to AMM1–AMM7, AMM10, and AMM25. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 26 ***Late Long-Term Timeframe***

27 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.  
28 Alternative 1B as a whole would result in the permanent loss of and temporary removal of 85 acres  
29 of modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is  
30 considered occupied.

31 The BDCP would restore at least 5,000 acres and protect at least 750 acres of valley/foothill riparian  
32 natural community, a portion of which is expected to consist of suitable riparian brush rabbit  
33 habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of  
34 riparian habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow  
35 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing  
36 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be  
37 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural  
38 community than what currently exists in CZ 7 and would be contiguous with existing modeled  
39 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of  
40 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,  
41 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural  
42 community would provide riparian woodrat habitat proportional to the amount of modeled habitat  
43 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area

1 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community  
2 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is  
3 comparable to or of higher value than existing modeled grassland habitat. All riparian protection  
4 would occur during the near-term period, to offset early riparian losses.

5 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and  
6 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for  
7 the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*  
8 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood  
9 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)  
10 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat  
11 during most years.

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
13 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
14 restoration of valley/foothill riparian that could overlap with the species model, would result in the  
15 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of  
16 valley/foothill riparian could overlap with the species model and would result in the protection of  
17 90 acres riparian woodrat modeled habitat.

18 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
19 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
20 opportunities for northward expansion of the species into the study area. Implementation of  
21 Alternative 1B conservation measures is not expected to adversely affect the riparian woodrat for  
22 the following reasons.

- 23 ● There are no riparian woodrat occurrences in the Plan Area.
- 24 ● The habitat that would be removed consists of small patches that are of moderate value for the  
25 species.
- 26 ● The habitat that would be removed permanently is a small proportion of the total habitat in the  
27 Plan Area (2%).
- 28 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of  
29 riparian woodrats, and to minimize loss of occupied habitat.
- 30 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not  
31 adversely affect any riparian woodrats that occupy restored floodplains.

32 Alternative 1B would provide a substantial benefit to the riparian woodrat through the net increase  
33 of available habitat and a net increase of habitat in protected status. These protected areas would be  
34 managed and monitored to support the species. The habitat that would be affected by Alternative 1B  
35 is currently unoccupied, and habitat removal is not expected to result in a discernible change in the  
36 abundance or distribution of riparian woodrats if they occupy study area habitats. Should the  
37 species be detected in the study area, AMM1-AMM7, AMM10, and AMM25 would avoid and  
38 minimize the effects of conservation component construction and implementation. Therefore, the  
39 loss of habitat and potential mortality of individuals under Alternative 1B would not have a  
40 significant impact on riparian woodrat.

1 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

2 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
3 modeled habitat for riparian woodrat. These effects are related construction activities associated  
4 with water conveyance construction, tidal natural community restoration construction, and  
5 construction of setback levees. Indirect effects on the species from construction associated with tidal  
6 natural community restoration are unlikely because tidal natural community restoration projects  
7 would be sited to avoid areas occupied by riparian woodrat. The activity most likely to result in  
8 noise and visual disturbance to riparian woodrat is the construction of setback levees.

9 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative  
10 1B would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly  
11 or through habitat modifications or result in a substantial reduction in numbers or a restriction in  
12 the range of riparian woodrats. Therefore, indirect effects of Alternative 1B would not have an  
13 adverse effect on riparian woodrat.

14 **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation  
15 measure construction and implementation could impact riparian woodrat and its habitat. AMM1-  
16 AMM7, AMM10, and AMM25 would avoid and minimize the impact.

17 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of**  
18 **Implementation of Conservation Components**

19 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in  
20 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic  
21 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the  
22 Plan Area). The area between existing levees that would be breached and the newly constructed  
23 setback levees would be inundated through seasonal flooding. The potentially inundated areas  
24 consist of moderate-value habitat for the species. Although the habitat consists of small patches and  
25 narrow bands of riparian vegetation and no riparian woodrats have detected in CZ 7, the riparian  
26 patches are in proximity to each other along the San Joaquin River and there are two species  
27 occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost  
28 patch of riparian habitat potentially affected by levee construction. The restored floodplains would  
29 transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently  
30 (e.g., every 10 years or more).

31 **NEPA Effects:** Alternative 1B's period inundation of 203 acres of riparian habitat for riparian  
32 woodrat is not expected to result in substantial adverse effects on riparian woodrat, either directly  
33 or through habitat modifications and would not result in a substantial reduction in numbers or a  
34 restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian  
35 woodrat would be minimized through construction and maintenance of flood refugia to allow  
36 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat  
37 habitat would not adversely affect the species Alternative 1B.

38 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of  
39 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian  
40 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would  
41 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to  
42 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result  
43 in significant impacts on riparian woodrat, either directly or through habitat modifications, and

1 would not result in a substantial reduction in numbers or a restriction in the range of riparian  
2 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 1B would have a less-  
3 than-significant impact.

#### 4 **Salt Marsh Harvest Mouse**

5 This section describes the effects of Alternative 1B, including water conveyance facilities  
6 construction and implementation of other conservation components, on the salt marsh harvest  
7 mouse. The habitat model used to assess effects for the salt marsh harvest mouse includes six  
8 habitat types: primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary  
9 upland habitat adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary  
10 habitat within managed wetlands (dominated by plants characteristic of low marsh), and upland  
11 habitats within managed wetland boundaries. The tidal and managed wetland habitats were  
12 discriminated recognizing that regardless of habitat value, managed wetlands are at high risk of  
13 catastrophic flooding and have lower long-term conservation value than tidal wetlands.

14 Construction and restoration associated with Alternative 1B conservation measures would result in  
15 effects on modeled salt marsh harvest mouse habitat, which would include permanent losses and  
16 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species  
17 post-restoration) as indicated in Table 12-1B-57. All of the effects on the species would take place  
18 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
19 Alternative 1B would also include the following conservation actions over the term of the BDCP to  
20 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 21 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
22 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
23 (Objective TBEWNC1.1, associated with CM4)
- 24 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
25 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to  
26 total (existing and restored) acreage targets for each complex as specified in the final Recovery  
27 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,  
28 associated with CM4).
- 29 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
30 natural community within the reserve system (Objective TBEWNC2.1).
- 31 ● Protect and enhance at least at least 1,500 acres of managed wetland in Grizzly Island Marsh  
32 Complex for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with  
33 CM3).
- 34 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide  
35 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective  
36 GNC1.4, associated with CM3 and CM8).
- 37 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or  
38 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems  
39 of Northern and Central California (Objective SMHM1.1).
- 40 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed  
41 wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final

1 Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase  
2 population levels above the current baseline (Objective SMHM1.2).

3 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
4 implementation of AMMs to minimize potential effects, impacts on the salt marsh harvest mouse  
5 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-1B-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with**  
7 **Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	TBEW Primary	64	67	0	0	0	0
	TBEW Secondary	0	0	0	0	0	0
	Upland Secondary	8	9	0	0	0	0
	MW Wetland Primary	1,913	5,323	0	0	0	0
	MW Wetland Secondary	315	807	0	0	0	0
	MW Upland	165	762	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>2,465</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>2,645</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

TBEW = tidal brackish emergent wetland

MW = managed wetland

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**  
10 **Mouse**

11 Alternative 1B tidal restoration (CM4) would be the only conservation measure resulting in effects  
12 on salt marsh harvest mouse habitat. Habitat enhancement and management activities (CM11),  
13 which include ground disturbance or removal of nonnative vegetation, could result in local adverse  
14 habitat effects. Each of these activities is described in detail below. A summary statement of the



1 combined impacts and NEPA and CEQA conclusions follows the individual conservation measure  
2 discussions.

- 3 ● *CM4 Tidal Natural Communities Restoration* would result in effects on 6,968 acres of salt marsh  
4 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592  
5 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas  
6 of converted habitat but these areas would ultimately provide suitable habitat for the species.  
7 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary  
8 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal  
9 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap  
10 with 13 CNDDDB records for salt marsh harvest mouse (California Department of Fish and  
11 Wildlife 2013); however, the BDCP's conservation actions assume that all suitable habitat in  
12 Suisun Marsh is occupied by the species.
- 13 ● *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
14 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to  
15 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of  
16 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat  
17 management actions included in *CM11 Natural Communities Enhancement and Management* that  
18 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in  
19 localized ground disturbances that could temporarily remove small amounts of salt marsh  
20 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection  
21 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of  
22 restored salt marsh harvest mouse habitat would also have enhancement and management  
23 actions that would include invasive species control, nonnative wildlife control, and vegetation  
24 management. Ground-disturbing activities, such as removal of nonnative vegetation are  
25 expected to have minor effects on habitat and are expected to result in overall improvements to  
26 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These  
27 effects cannot be quantified, but are expected to be minimal and would be avoided and  
28 minimized by the AMMs listed below.
- 29 ● *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or  
30 mortality to salt marsh harvest mouse during restoration, enhancement, and management  
31 activities. However, preconstruction surveys, construction monitoring, and other measures  
32 would be implemented to avoid and minimize injury or mortality of this species during these  
33 activities, as required by the AMMs listed below.

34 The following paragraphs summarize the combined effects discussed above and describe other  
35 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
36 also included.

### 37 ***Near-Term Timeframe***

38 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
39 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
40 the effects of near-term covered activities would not be adverse under NEPA and would be less than  
41 significant under CEQA. Alternative 1B would affect 2,465 acres of salt marsh harvest mouse  
42 modeled habitat in the study area in the near-term. These effects include 1,517 acres of permanent  
43 loss and 948 acres of converted habitat. Most of the habitat converted would be from primary

1 habitats (599 acres consisting of 64 acres of tidal brackish emergent wetland and 534 acres of  
2 managed wetland) to secondary tidal brackish emergent wetland.

3 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
4 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
5 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
6 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to  
7 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
8 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
9 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
10 near-term protection and restoration efforts. These Plan goals represent performance standards for  
11 considering the effectiveness of restoration actions. The acres of protection and restoration  
12 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt  
13 marsh harvest mouse.

14 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 15 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
16 wetlands as noted in the specie's draft recovery plan, because the conversion of managed  
17 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by  
18 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
19 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
20 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
21 prolonged period (sometimes a decade or more) in which resident mice populations are  
22 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
23 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
24 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
25 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
26 habitat from a variety of factors, including flooding from levee failure and cessation of active  
27 management (which is often necessary to maintain habitat values in managed wetlands).  
28 Therefore, the temporary effects under Alternative 1B would be consistent with those deemed  
29 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 30 ● Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of  
31 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural  
32 communities restoration does not adversely affect the salt marsh harvest mouse population,  
33 restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of  
34 restoration as it occurs, ensure that short-term population loss is relatively small and  
35 incremental, and maintain local source populations to recolonize newly restored areas. The tidal  
36 restoration projects in Suisun Marsh would be implemented in 150-acre or greater patches that  
37 provide viable habitat areas for the salt marsh harvest mouse habitat consistent with the draft  
38 tidal marsh recovery plan (U.S. Fish and Wildlife Service 2010).
- 39 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
40 BDCP Chapter 3, Section 3.4.4.3.4,) and adaptive management would be applied to ensure  
41 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
42 Section 3.6).
- 43 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
44 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit

1 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
2 forage and cover.

3 Because there would be no project-level impacts on salt marsh harvest mouse from CM1, the  
4 analysis of the effects of conservation actions does not include a comparison with standard ratios  
5 used for project-level NEPA analyses.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
10 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
11 areas. The AMMs are described in detail in BDCP Appendix 3.C.

### 12 **Late Long-Term Timeframe**

13 Based on modeled habitat, the study area supports approximately 35,588 acres of salt marsh  
14 harvest mouse modeled habitat. Alternative 1B as a whole would result in effects on 6,968 acres of  
15 saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376  
16 acres of permanent losses and 1,592 acres of habitat conversions. These effects (loss and  
17 conversion) would be to 20% of the modeled habitat in the study area. Most of these effects (99%)  
18 would be to managed wetlands, which though are known to be occupied by salt marsh harvest  
19 mouse are at high risk of catastrophic flooding and have a lower long-term conservation value than  
20 tidal wetlands (U.S. Fish and Wildlife Service 2010). Effects on up to 20% of the species' habitat in  
21 the Plan Area may diminish the salt marsh harvest mouse population in the Plan Area and result in  
22 reduced genetic diversity, thereby putting the local population at risk of local extirpation due to  
23 random environmental fluctuations or catastrophic events. This effect is expected to be greatest if  
24 large amounts of habitat are removed at one time in Suisun Marsh and are not effectively restored  
25 for many years, and if there are no adjacent lands with salt marsh harvest mouse populations to  
26 recolonize restored areas.

27 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,  
28 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh  
29 harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associated with CM4); the  
30 protection of 6,500 acres of managed wetlands, 1,500 acres of which would be specifically managed  
31 for salt marsh harvest mouse (Objectives SMHM1.2 and MWNC1.1, associated with CM3), and the  
32 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of  
33 tidal restoration) to provide upland refugia for salt marsh harvest mouse (Objective GNC1.4,  
34 associated with). Other factors relevant to effects on salt marsh harvest mouse are listed here.

- 35 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
36 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the  
37 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is  
38 often accomplished by breaching levees and converting diked nontidal marsh currently  
39 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.  
40 Conversion of these subsided areas requires sedimentation and accretion over time to restore  
41 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident  
42 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service  
43 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan  
44 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.

1 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
2 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and  
3 cessation of active management (which is often necessary to maintain habitat values in managed  
4 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
5 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.  
6 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan  
7 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.  
8 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
9 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and  
10 cessation of active management (which is often necessary to maintain habitat values in managed  
11 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
12 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 13 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does  
14 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
15 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
16 that short-term population loss is relatively small and incremental, and maintain local source  
17 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
18 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
19 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
20 and Wildlife Service 2010).
- 21 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
22 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
23 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
24 Section 3.6).
- 25 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
26 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
27 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
28 forage and cover.
- 29 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
30 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
31 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
32 habitat value, which is expected to accommodate larger populations and to therefore increase  
33 population resilience to random environmental events and climate change.

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
35 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
36 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh  
37 harvest mouse.

38 **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse  
39 habitat from Alternative 1B in the near-term would represent an adverse effect as a result of habitat  
40 modification and potential direct mortality of a special-status species. However, the BDCP has  
41 committed to habitat protection, restoration, management, and enhancement associated with CM3,  
42 CM4, CM8, and CM11. This habitat protection, restoration, management, and enhancement would be  
43 guided by species-specific goals and objectives and by AMM1–AMM5 and AMM26, which would be  
44 in place throughout the construction period. Considering these commitments, losses and

1 conversions of salt marsh harvest mouse habitat and potential mortality of individuals under  
2 Alternative 1B would not be an adverse effect.

3 ***CEQA Conclusion:***

4 ***Near-Term Timeframe***

5 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
6 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
7 impacts of near-term covered activities would be less than significant under CEQA. Alternative 1B  
8 would affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-  
9 term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most  
10 of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal  
11 brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish  
12 emergent wetland.

13 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
14 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
15 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
16 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to  
17 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
18 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
19 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
20 near-term protection and restoration efforts. These Plan goals represent performance standards for  
21 considering the effectiveness of restoration actions. The acres of protection and restoration  
22 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt  
23 marsh harvest mouse habitat.

24 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 25 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
26 wetlands as noted in the specie's draft recovery plan because the conversion of managed  
27 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by  
28 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
29 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
30 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
31 prolonged period (sometimes a decade or more) in which resident mice populations are  
32 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
33 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
34 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
35 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
36 habitat from a variety of factors, including flooding from levee failure and cessation of active  
37 management (which is often necessary to maintain habitat values in managed wetlands).  
38 Therefore, the temporary effects under Alternative 1B would be consistent with those deemed  
39 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 40 ● To ensure that temporal loss as a result of tidal natural communities restoration does not  
41 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be  
42 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-  
43 term population loss is relatively small and incremental, and maintain local source populations

1 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be  
2 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh  
3 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife  
4 Service 2010).

- 5 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
6 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
7 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
8 Section 3.6).
- 9 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
10 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
11 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
12 forage and cover.

13 Because there would be no project-level impacts on salt marsh harvest mouse from CM1, the  
14 analysis of the effects of conservation actions does not include a comparison with standard ratios  
15 used for project-level CEQA analyses.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
20 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
21 areas. The AMMs are described in detail in BDCP Appendix 3.C.

22 These commitments are more than sufficient to support the conclusion that the near-term impacts  
23 of Alternative 1B would be less than significant.

#### 24 **Late Long-Term Timeframe**

25 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.  
26 Alternative 1B as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse  
27 modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and  
28 1,592 acres of habitat conversions. The Plan includes a commitment to restore or create 6,000 acres  
29 of tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh  
30 habitat (primary habitat for salt marsh harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, and  
31 SMHM1.1, associated with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of  
32 which would be specifically managed for salt marsh harvest mouse (Objectives SMHM1.2 and  
33 MWNC1.1, associated with CM3), and the protection and/or restoration of grassland adjacent to  
34 tidal restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh  
35 harvest mouse (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects  
36 on salt marsh harvest mouse include:

- 37 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
38 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the  
39 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is  
40 often accomplished by breaching levees and converting diked nontidal marsh currently  
41 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.  
42 Conversion of these subsided areas requires sedimentation and accretion over time to restore  
43 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident

1 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service  
2 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan  
3 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.  
4 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
5 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and  
6 cessation of active management (which is often necessary to maintain habitat values in managed  
7 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
8 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 9 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does  
10 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
11 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
12 that short-term population loss is relatively small and incremental, and maintain local source  
13 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
14 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
15 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
16 and Wildlife Service 2010).
- 17 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
18 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
19 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
20 Section 3.6).
- 21 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
22 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
23 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
24 forage and cover.
- 25 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
26 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
27 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
28 habitat value, which is expected to accommodate larger populations and to therefore increase  
29 population resilience to random environmental events and climate change.

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
31 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
32 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh  
33 harvest mouse.

34 Alternative 1B would result in substantial modifications to salt marsh harvest mouse habitat in the  
35 absence of other conservation actions. However, with habitat protection, restoration, management,  
36 and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and  
37 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the time period of  
38 construction, Alternative 1B over the term of the BDCP would not result in a substantial adverse  
39 effect through habitat modifications and would not substantially reduce the number or restrict the  
40 range of the species. Therefore, the alternative would have a less-than-significant impact on salt  
41 marsh harvest mouse.

1 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

2 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
3 and management and enhancement activities (CM11) could result in temporary noise and visual  
4 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of  
5 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM5, and  
6 AMM26, which would be in effect throughout the term of the Plan.

7 The use of mechanical equipment during the implementation of the conservation measures could  
8 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest  
9 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on  
10 the species and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would  
11 ensure measures are in place to prevent runoff from the construction area and potential effects of  
12 sediment on salt marsh harvest mouse.

13 Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to  
14 mercury. Mercury is transformed into the more bioavailable form of methylmercury under  
15 anaerobic conditions, which in the environment typically occurs in sediments subjected to regular  
16 wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that  
17 create newly inundated areas could increase bioavailability of mercury. In general, the highest  
18 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
19 drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be  
20 primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl  
21 mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury  
22 by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et  
23 al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown  
24 that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al.  
25 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to  
26 methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay  
27 showed an absence of salt marsh harvest mouse where mercury concentrations measured in house  
28 mice (*Mus musculus*) livers were  $\geq 0.19$   $\mu\text{g/g}$  (dry weight) (Clark et al. 1992). Clark et al (1992) also  
29 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected  
30 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh  
31 harvest mouse at certain locations may be associated with higher amounts of mercury and  
32 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt  
33 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants  
34 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown  
35 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh  
36 harvest mouse.

37 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
38 under the plan would generate less methylmercury than the existing managed wetlands. The  
39 potential for salt marsh harvest mouse exposure to methyl mercury in Suisun Marsh may decrease  
40 in the long term because the creation of tidal brackish emergent wetland would predominantly  
41 result from the conversion of managed wetlands. *CM12 Methylmercury Management* includes  
42 provisions for project-specific Mercury Management Plans. Along with avoidance and minimization  
43 measures and adaptive management and monitoring, CM12 could reduce the effects of  
44 methylmercury on salt marsh harvest mouse resulting from BDCP tidal restoration.



1 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative  
2 1B would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also  
3 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,  
4 or restrict the species' range. Therefore, the indirect effects of Alternative 1B would not have an  
5 adverse effect on salt marsh harvest mouse.

6 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
7 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical  
8 equipment during construction could cause the accidental release of petroleum or other  
9 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge  
10 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With  
11 implementation of AMM1–AMM5 and AMM26 as part of Alternative 1B construction, operation and  
12 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh  
13 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result  
14 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The  
15 indirect effects of BDCP Alternative 1B would have a less-than-significant impact on salt marsh  
16 harvest mouse.

17 Salt marsh harvest mouse could experience indirect effects from increased exposure to  
18 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the  
19 potential indirect effects of methylmercury would not result in a substantial reduction in numbers  
20 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-  
21 significant impact on the species.

## 22 **Suisun Shrew**

23 Primary Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and  
24 certain *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by  
25 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal  
26 wetland edge were classified separately as secondary habitat because they are used seasonally  
27 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.  
28 Construction and restoration associated with Alternative 1B would also include the following  
29 conservation actions over the term of the BDCP to benefit Suisun shrew (BDCP Chapter 3,  
30 *Conservation Strategy*).

- 31 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
32 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
33 (Objective TBEWNC1.1, associated with CM4)
- 34 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
35 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing  
36 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal  
37 Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2, associated with  
38 CM4).
- 39 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
40 natural community within the reserve system (Objective TBEWNC2.1).
- 41 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at  
42 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which  
43 provides refugia during high tides (Objective GNC1.4, associated with CM3 and CM8).

1 As explained below, with the restoration or protection of these amounts of habitat, impacts on the  
 2 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA  
 3 purposes.

4 **Table 12-1B-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 1B (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

b See discussion below for a description of applicable CMs.

c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

5

6 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun shrew**

7 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to  
 8 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground  
 9 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of  
 10 these activities is described in detail below. A summary statement of the combined impacts and  
 11 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 12 • *CM4 Tidal Natural Communities Restoration* would result in effects on 401 acres of Suisun shrew  
 13 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat  
 14 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but  
 15 would ultimately provide suitable habitat for the species. However, all 9 acres would be  
 16 converted from secondary to primary habitat and therefore over would be net benefit to the  
 17 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun  
 18 shrew (California Department of Fish and Wildlife 2013).
- 19 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
 20 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to  
 21 provide habitat for covered species, including Suisun shrew. A variety of habitat management  
 22 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
 23 to enhance and manage these areas may result in localized ground disturbances that could

1 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would  
2 be protected and/or restored within 200 feet of restored tidal marsh would also have  
3 enhancement and management actions that would include invasive species control, nonnative  
4 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of  
5 nonnative vegetation are expected to have minor effects on habitat and are expected to result in  
6 overall improvements to and maintenance of Suisun shrew habitat values over the term of the  
7 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
8 and minimized by the AMMs listed below.

- 9 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or  
10 mortality to Suisun shrew during restoration, enhancement, and management activities.  
11 However, preconstruction surveys, construction monitoring, and other measures would be  
12 implemented to avoid and minimize injury or mortality of this species during these activities, as  
13 required by the AMM described below.

14 The following paragraphs summarize the combined effects discussed above and describe other  
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
16 also included.

#### 17 ***Near-Term Timeframe***

18 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
19 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
20 the effects of near-term covered activities would not be adverse under NEPA. Alternative 1B would  
21 affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects  
22 include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat  
23 being converted to primary habitat.

24 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
25 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
26 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals  
27 represent performance standards for considering the effectiveness of restoration actions. The acres  
28 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
29 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

30 Other factors relevant to effects on Suisun shrew.

- 31 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
32 loss of habitat and habitat fragmentation
- 33 • The habitat that would be restored and protected would consist of large blocks of contiguous  
34 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
35 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
36 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
37 increase population resilience to random environmental events and climate change.
- 38 • The amount of tidal habitat restored in the near-term (2,000 acres) would greatly exceed the  
39 amount permanently lost (105 acres).

40 Because there would be no project-level impacts on Suisun shrew resulting from CM1, the analysis  
41 of the effects of conservation actions does not include a comparison with standard ratios used for  
42 project-level NEPA analyses.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
5 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
6 areas. The AMMs are described in detail in BDCP Appendix 3.C.

### 7 **Late Long-Term Timeframe**

8 Based on modeled habitat, the study area supports approximately 7,515 acres of Suisun shrew  
9 modeled habitat. Alternative 1B as a whole would result in effects on 401 acres of Suisun shrew  
10 modeled habitat over the term of the Plan, which would include 377 acres of permanent losses and  
11 24 acres of habitat conversions (roughly 5% of the habitat in the study area). The Plan includes a  
12 commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of  
13 which would target middle and high marsh habitat (primary habitat for Suisun shrew) (Objectives  
14 TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the protection and/or restoration of  
15 grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration, of which  
16 approximately 150 feet of this area would benefit the species) to provide upland refugia for Suisun  
17 shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on Suisun  
18 shrew are listed here.

- 19 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
20 loss of habitat and habitat fragmentation
- 21 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
22 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
23 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
24 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
25 increase population resilience to random environmental events and climate change.
- 26 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
27 and converted (401 acres).

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
29 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
30 the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun shrew.

31 **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from  
32 Alternative 1B would represent an adverse effect as a result of habitat modification and potential  
33 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,  
34 restoration, management, and enhancement associated with CM3, CM4, CM8, and CM11. This habitat  
35 protection, restoration, management, and enhancement would be guided by biological goals and  
36 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction  
37 period. Considering these commitments, losses and conversions of Suisun shrew habitat and  
38 potential mortality of individuals in both the near-term and the late long-term under Alternative 1B  
39 would not be an adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
5 the impacts of near-term covered activities would be less than significant under CEQA. Alternative  
6 1B would impact 105 acres of Suisun shrew modeled habitat in the study area in the near-term.  
7 These effects include 90 acres of permanent loss and 15 acres of converted habitat, which is all  
8 secondary habitat being converted to primary habitat.

9 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
10 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
11 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals  
12 represent performance standards for considering the effectiveness of restoration actions. The acres  
13 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
14 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

15 Other factors relevant to effects on Suisun shrew.

- 16 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
17 loss of habitat and habitat fragmentation
- 18 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
19 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
20 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
21 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
22 increase population resilience to random environmental events and climate change.
- 23 ● The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount  
24 permanently lost (105 acres).

25 Because there would be no project-level impacts on Suisun shrew resulting from CM1, the analysis  
26 of the effects of conservation actions does not include a comparison with standard ratios used for  
27 project-level CEQA analyses.

28 The Plan also includes commitments to *AMM1 Worker Awareness Training*, *AMM2 Construction Best*  
29 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*  
30 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, and  
31 *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs include elements that avoid  
32 or minimize the risk of affecting habitats and species adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C.

34 These commitments are more than sufficient to support the conclusion that the near-term effects of  
35 Alternative 1B would be less than significant under CEQA.

36 **Late Long-Term Timeframe**

37 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 1B  
38 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the  
39 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions  
40 (roughly 5% of the habitat in the study area). The Plan includes a commitment to restore or create  
41 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high

1 marsh habitat (primary habitat for Suisun shrew) (Objectives TBEWNC1.1, TBEWNC1.2, and  
2 SMHM1.1, associated with CM4) and the protection and/or restoration of grassland adjacent to tidal  
3 restoration (areas within 200 feet of tidal restoration, of which approximately 150 feet of this area  
4 would benefit the species) to provide upland refugia for Suisun shrew (Objective GNC1.4, associated  
5 with CM3 and CM8). Other factors relevant to effects on Suisun shrew are listed here.

- 6 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
7 loss of habitat and habitat fragmentation
- 8 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
9 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
10 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
11 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
12 increase population resilience to random environmental events and climate change.
- 13 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
14 (401 acres).

15 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
16 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
17 the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun shrew.

18 Alternative 1B would result in substantial modifications to Suisun shrew habitat in the absence of  
19 other conservation actions. However, with habitat protection, restoration, management, and  
20 enhancement associated with CM3, CM4, CM8 and CM11, guided by species-specific goals and  
21 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction  
22 phase, Alternative 1B over the term of the BDCP would not result in a substantial adverse effect  
23 through habitat modifications and would not substantially reduce the number or restrict the range  
24 of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

### 25 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

26 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
27 and management and enhancement activities (CM11) could result in temporary noise and visual  
28 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.  
29 These potential effects would be minimized or avoided through AMM1–AMM5, and AMM26, which  
30 would be in effect throughout the term of the Plan.

31 The use of mechanical equipment during the implementation of the conservation measures could  
32 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and  
33 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species  
34 and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would ensure  
35 measures are in place to prevent runoff from the construction area and potential effects of sediment  
36 on Suisun shrew.

37 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury  
38 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,  
39 which in the environment typically occurs in sediments subjected to regular wetting and drying  
40 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
41 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates  
42 are associated with high tidal marshes that experience intermittent wetting and drying and

1 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be  
2 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal  
3 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh  
4 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations  
5 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and  
6 forage on earthworms and other prey that live within contaminated sediments (Talmage and  
7 Walton 1993; Hinton and Veiga 2002).

8 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
9 under the plan would generate less methylmercury than the existing managed wetlands. The  
10 potential for Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long  
11 term because the creation of tidal brackish emergent wetland would predominantly result from the  
12 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for project-  
13 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
14 management and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew  
15 resulting from BDCP tidal restoration.

16 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1B  
17 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either  
18 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that  
19 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the  
20 indirect effects of Alternative 1B would not have an adverse effect on Suisun shrew.

21 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
22 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during  
23 construction could cause the accidental release of petroleum or other contaminants that could  
24 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun  
25 shrew habitat could also impact the species. With implementation of AMM1–AMM5 and AMM26 as  
26 part of Alternative 1B construction, operation and maintenance, the BDCP would avoid the potential  
27 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in  
28 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of  
29 Suisun shrew. The indirect effects of BDCP Alternative 1B would have a less-than-significant impact  
30 on Suisun shrew.

31 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a  
32 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects  
33 of methylmercury would not result in a substantial reduction in numbers or a restriction in the  
34 range of Suisun shrew, and, therefore, would have a less-than-significant impact on the species.

### 35 **San Joaquin Kit Fox and American Badger**

36 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the  
37 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along  
38 the study area's southwestern edge, in CZ 7–CZ 10. The study area represents the extreme  
39 northeastern corner of the species' range in California, which extends westward and southward  
40 from the study area border. The northern range of the San Joaquin kit fox (including the study area)  
41 was most likely marginal habitat historically and has been further degraded due to development  
42 pressures, habitat loss, and fragmentation (Clark et al. 2007). CNDDDB (California Department of Fish  
43 and Wildlife 2013) reports twelve occurrences of San Joaquin kit foxes along the extreme western  
44 edge of the Plan Area within CZ 8, south of Brentwood (Figure 12-49). However, Clark et al. (2007)

1 provide evidence that a number of CNDDDB occurrences in the northern portion of the species' range  
2 may be coyote pups misidentified as San Joaquin kit foxes. Smith et al. (2006) suggest that the  
3 northern range may possibly be a population sink for the San Joaquin kit fox.

4 Construction and restoration associated with Alternative 1B conservation measures would result in  
5 both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-1B-  
6 59). Grassland restoration, and protection and management of natural communities could affect  
7 modeled San Joaquin kit fox habitat and potential American badger habitat. Full implementation of  
8 Alternative 1B would also include biological objectives over the term of the BDCP to benefit the San  
9 Joaquin kit fox which would also benefit American badger which uses similar habitat (BDCP Chapter  
10 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting  
11 and enhancing habitat in the northern extent of the species' range to increase the likelihood that kit  
12 fox may reside and breed in the Plan Area; and providing connectivity to habitat outside the Plan  
13 Area. The conservation measures that would be implemented to achieve the biological goals and  
14 objectives are summarized below.

- 15 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
16 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
17 associated with CM3-CM8, and CM11).
- 18 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
19 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 20 ● Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali  
21 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 22 ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core  
23 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of  
24 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
25 associated with CM3).
- 26 ● Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool  
27 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with  
28 CM3 and CM9).
- 29 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 30 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
31 (Objective GNC1.2, associated with CM3 and CM8).
- 32 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
33 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
34 ASWNC2.3, associated with CM11).
- 35 ● Increase prey, especially small mammals and insects, for grassland-foraging species in  
36 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal  
37 wetland complex (Objective ASWNC2.4, associated with CM11).
- 38 ● Increase burrow availability for burrow-dependent species in grasslands surrounding vernal  
39 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with  
40 CM11).



- 1 • Increase prey, especially small mammals and insects, for grassland-foraging species in
- 2 grasslands surrounding vernal pools within restored and protected vernal pool complex
- 3 (Objective VPNC2.5, associated with CM11).
- 4 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
- 5 CM11).
- 6 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-
- 7 foraging species (Objective GNC2.4, associated with CM11).

8 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 9 the AMMs to reduce potential effects, impacts on San Joaquin kit fox and American badger would not  
 10 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-1B-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 1B**  
 12 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	172	172	165	165	NA	NA
<b>Total Impacts CM1</b>		<b>172</b>	<b>172</b>	<b>165</b>	<b>165</b>		
CM2-CM18	Grassland	3	8	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>3</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>175</b>	<b>180</b>	<b>165</b>	<b>165</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

13

14 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**  
 15 **and American Badger**

16 Alternative 1B conservation measures would result in the permanent and temporary loss combined  
 17 of 345 acres of modeled habitat for the San Joaquin kit fox (Table 12-1B-59). Because American  
 18 badger uses grasslands for denning and foraging and shares the same geographic locations as the  
 19 San Joaquin kit fox, effects on are anticipated to be the same as those described for San Joaquin kit  
 20 fox. There is one San Joaquin kit fox and no American badger occurrences that overlap with the Plan  
 21 footprint. Construction of Alternative 1B water conveyance facilities (CM1) and recreation facilities  
 22 (CM11) would remove habitat. Habitat enhancement and management activities (CM11) could  
 23 result in local adverse effects on species. In addition, construction vehicle activity could cause injury  
 24 or mortality of San Joaquin kit foxes and badgers. Each of these individual activities is described

1 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion  
2 follow the individual conservation measure discussions.

- 3 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the  
4 permanent loss of approximately 172 acres and the temporary loss of 165 acres of modeled San  
5 Joaquin kit fox habitat and American badger habitat. This habitat is located in areas of  
6 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to  
7 Clifton Court Forebay, in CZ 8.
- 8 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
9 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin  
10 kit fox modeled habitat. AMM24 would be implemented to ensure that San Joaquin kit fox dens  
11 are avoided, as described in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Passive  
12 recreation in the reserve system could result in disturbance of San Joaquin kit foxes at their den  
13 site. Natal and pupping dens would be particularly vulnerable to human disturbance.  
14 Additionally, disease could be transmitted from domestic dogs that enter the reserve system  
15 with recreational users. However, *AMM37 Recreation* would prohibit construction of new trails  
16 within 250 feet of active San Joaquin kit fox dens. Existing trails would be closed within 250 feet  
17 of active natal/pupping dens until young have vacated, and within 50 feet of other active dens.  
18 No dogs would be allowed on reserve units with active San Joaquin kit fox populations. Rodent  
19 control would be prohibited even on grazed or equestrian access areas with San Joaquin kit fox  
20 populations. With these restrictions, recreation-related effects on San Joaquin kit fox are  
21 expected to be minimal.

22 The BDCP would require the protection of grasslands in large patch sizes connected to existing  
23 large areas of grassland, habitat corridors and transition habitat areas to improve the ecological  
24 functions of the grasslands necessary to support the San Joaquin kit fox. American badger is  
25 expected to benefit in a similar fashion.

26 The BDCP would require the enhancement and management of these protected existing  
27 grasslands and restored grasslands to improve their function as a natural community of plants  
28 and wildlife and for associated covered species, including San Joaquin kit fox. The BDCP also  
29 includes actions to improve rodent prey availability.

30 However, management activities could result in injury or mortality of San Joaquin kit fox or  
31 American badger if individuals were present in work sites or if dens were located in the vicinity  
32 of habitat management work sites. A variety of habitat management actions included in *CM11*  
33 that are designed to enhance wildlife values on protected lands may result in localized ground  
34 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American  
35 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal  
36 of nonnative vegetation and road and other infrastructure maintenance activities, are expected  
37 to have minor effects on available habitat and are expected to result in overall improvements to  
38 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.  
39 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
40 minimized through the AMMs listed below. These AMMs would remain in effect throughout the  
41 BDCP's construction phase.

- 42 • *Operations and maintenance*: Ongoing maintenance of BDCP facilities would be expected to have  
43 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction  
44 operations and maintenance of the above-ground water conveyance facilities and restoration  
45 infrastructure could result in ongoing but periodic disturbances that could affect either species'

1 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would  
2 include vegetation management, levee and structure repair, and regrading of roads and  
3 permanent work areas. These effects, however, would be minimized with implementation of  
4 AMM1–AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,  
5 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*  
6 *Badger*.

- 7 • Injury and direct mortality: Water conveyance facility construction may cause injury to or  
8 mortality of either species. If San Joaquin kit fox or American badger reside where activities take  
9 place (most likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment  
10 for land clearing, construction, operations and maintenance, and restoration, enhancement, and  
11 management activities could result in injury to or mortality of either species. Measures would be  
12 implemented to avoid and minimize injury to or mortality of these species as described in  
13 AMM1–AMM6, AMM10, AMM24, and AMM37 (see BDCP Appendix 3.C) and Mitigation Measure  
14 BIO-162.

15 The following paragraphs summarize the combined effects discussed above and describe other  
16 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
17 also included.

### 18 ***Near-Term Timeframe***

19 Because water conveyance facilities construction is being evaluated at the project level, the near-  
20 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
21 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
22 not be adverse under NEPA.

23 Under Alternative 1B there would be a loss of 340 acres of San Joaquin kit fox modeled habitat and  
24 American badger habitat from CM1 (337 acres) and CM11 (3 acres). Typical NEPA project-level  
25 mitigation ratio for the natural community that would be affected and that is identified in the  
26 biological goals and objectives for San Joaquin kit fox in Chapter 3 of the BDCP would be 2:1 for  
27 protection of grassland. Using this ratio would indicate that 680 acres of grassland should be  
28 protected for San Joaquin kit fox to mitigate near-term losses.

29 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
30 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
31 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
32 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
33 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities  
34 are expected to be concluded during the first 10 years of plan implementation, which is close enough  
35 in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These  
36 commitments are more than sufficient to support the conclusion that the near-term effects of  
37 Alternative 1B would be not be adverse under NEPA, because the number of acres required to meet  
38 the typical ratios described above would be only 680 acres of grassland protected.

39 The effects on San Joaquin kit fox and American badger habitat from Alternative 1B as a whole  
40 would represent an adverse effect as a result of habitat modification of a special-status species and  
41 potential for direct mortality in the absence of other conservation actions. However, with habitat  
42 protection, restoration associated, and management and enhancement with CM3, CM8, and CM11 in  
43 addition to *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices* and

1 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*  
2 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*  
3 *Reusable Tunnel Material, and Dredged Material, AMM10 Restoration of Temporarily Affected Natural*  
4 *Communities, AMM24 San Joaquin Kit Fox, and AMM37 Recreation, the effects of Alternative 1B on*  
5 *San Joaquin kit fox and American badger would not be adverse under NEPA. The AMMs include*  
6 *elements that avoid or minimize the risk of construction activity affecting habitat and species*  
7 *adjacent to work areas and storage sites. Remaining effects would be addressed by implementation*  
8 *of Mitigation Measure BIO-162. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance**  
9 *and *Minimization Measures.**

### 10 **Late Long-Term Timeframe**

11 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1B as a  
12 whole would result in the permanent loss of and temporary effects on 345 acres of modeled habitat  
13 for San Joaquin kit fox and potential habitat for American badger representing 6% of the modeled  
14 habitat.

15 With full implementation of the BDCP, at least 1,000 acres of grassland would be protected in CZ 8,  
16 where the San Joaquin kit fox is most likely to occur if present in the Plan Area. Additionally, a  
17 portion of the 2,000 acres of grassland restoration would likely occur in CZ 8. Assuming the restored  
18 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
19 modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in the Plan Area  
20 consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands would  
21 be suitable for the species. Because San Joaquin kit fox home ranges are large (varying from  
22 approximately 1 to 12 square miles; see BDCP Appendix 2.A, *Covered Species Accounts*), habitat  
23 connectivity is key to the conservation of the species. Grasslands would be acquired for protection in  
24 locations that provide connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1)  
25 and to other adjoining San Joaquin kit fox habitat within and adjacent to the Plan Area. Connectivity  
26 to occupied habitat adjacent to the Plan Area would help ensure the movement of San Joaquin kit  
27 foxes, if present, to larger habitat patches outside of the Plan Area in Contra Costa County. Grassland  
28 protection would focus in particular on acquiring the largest remaining contiguous patches of  
29 unprotected grassland habitat, which are located south of SR 4 in CZ 8 (BDCP Appendix 2.A, *Covered*  
30 *Species Accounts*). This area connects to over 620 acres of existing habitat that was protected under  
31 the East Contra Costa County HCP/NCCP. Grasslands in CZ 8 would also be managed and enhanced  
32 to increase prey availability and to increase mammal burrows, which could benefit the San Joaquin  
33 kit fox by increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the  
34 northern portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5,  
35 Objective GNC2.3, and Objective GNC2.4). These management and enhancement actions are  
36 expected to benefit the San Joaquin kit fox as well as the American badger by increasing the habitat  
37 value of the protected and restoration grasslands.

38 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
39 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
40 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
41 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
42 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
43 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
44 construction.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
2 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
3 restoration of grassland and vernal pool that could overlap with the species model, would result in  
4 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of  
5 grassland and vernal pool complex could overlap with the species model and would result in the  
6 protection of 1,011 acres of modeled habitat for San Joaquin kit fox.

7 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and  
8 American badger habitat from Alternative 1B would represent an adverse effect as a result of  
9 habitat modification and potential direct mortality of special-status species. However, with habitat  
10 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11, and  
11 guided by AMM1–AMM6, AMM10, AMM24, AMM37, which would be in place throughout the time  
12 period of construction, and with implementation of Mitigation Measure BIO-162, *Conduct*  
13 *Preconstruction Survey for American Badger*, the effects of Alternative 1B as a whole on San Joaquin  
14 kit fox and American badger would not be adverse under NEPA.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the  
18 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient  
19 habitat protection or restoration in an appropriate timeframe to ensure that the construction effects  
20 would be less than significant for CEQA purposes.

21 Under Alternative 1B there would be a loss of 340 acres of San Joaquin kit fox modeled habitat and  
22 American badger habitat from CM1 (337 acres) and CM11 (3 acres). Typical NEPA project-level  
23 mitigation ratio for the natural community that would be affected and that is identified in the  
24 biological goals and objectives for San Joaquin kit fox in Chapter 3 of the BDCP would be 2:1 for  
25 protection of grassland. Using this ratio would indicate that 680 acres of grassland should be  
26 protected for San Joaquin kit fox to mitigate near-term losses.

27 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
28 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
29 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
30 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
31 acres of grassland (Objective GNC1.1).

32 These conservation actions would occur in the same timeframe as the construction losses, thereby  
33 avoiding adverse effects of habitat loss on San Joaquin kit fox and American badger. These Plan  
34 objectives represent performance standards for considering the effectiveness of CM3 protection and  
35 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
36 and the additional detail in the biological objectives for San Joaquin kit fox and the mitigation  
37 measure for American badger satisfy the typical mitigation that would be applied to the project-level  
38 effects of CM1, as well as mitigate the near-term effects of the other conservation measures.

39 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM24, and AMM37  
40 which include elements that avoid or minimize the risk of construction activity impacting habitat  
41 and species adjacent to work areas. Remaining effects would be addressed by implementation of  
42 Mitigation Measure BIO-162. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and*  
43 *Minimization Measures*.

1 These commitments are more than sufficient to support the conclusion that the near-term effects of  
2 Alternative 1B on San Joaquin kit fox and American badger would be less than significant under  
3 CEQA, because the number of acres required to meet the typical ratios described above would be  
4 only 680 acres of grassland protected.

5 ***Late Long-Term Timeframe***

6 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1B as a  
7 whole would result in the permanent loss of and temporary effects on 345 acres of modeled habitat  
8 for San Joaquin kit fox and potential habitat for American badger representing 6% of the modeled  
9 habitat.

10 With full implementation of Alternative 1B, at least 1,000 acres of grassland would be protected in  
11 CZ 8, where the San Joaquin kit fox is most likely to occur if present in the Plan Area. Additionally, a  
12 portion of the 2,000 acres of grassland restoration would likely occur in CZ 8. Assuming the restored  
13 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
14 modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in the Plan Area  
15 consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands would  
16 be suitable for the species (6.6% of 2,000 acres). Because San Joaquin kit fox home ranges are large  
17 (ranging from around 1 to 12 square miles; see BDCP Appendix 2.A, *Covered Species Accounts*),  
18 habitat connectivity is key to the conservation of the species. Grasslands would be acquired for  
19 protection in locations that provide connectivity to existing protected breeding habitats in CZ 8  
20 (Objective L3.1) and to other adjoining San Joaquin kit fox habitat within and adjacent to the Plan  
21 Area. Connectivity to occupied habitat adjacent to the Plan Area would help ensure the movement of  
22 San Joaquin kit foxes, if present, to larger habitat patches outside of the Plan Area in Contra Costa  
23 County. Grassland protection would focus in particular on acquiring the largest remaining  
24 contiguous patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (BDCP  
25 Appendix 2.A). This area connects to over 620 acres of existing habitat that was protected under the  
26 East Contra Costa County HCP/NCCP. Grasslands in CZ 8 would also be managed and enhanced to  
27 increase prey availability and to increase mammal burrows, which could benefit the San Joaquin kit  
28 fox by increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the  
29 northern portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5,  
30 Objective GNC2.3, and Objective GNC2.4). These management and enhancement actions are  
31 expected to benefit the San Joaquin kit fox as well as the American badger by increasing the habitat  
32 value of the protected and restoration grasslands.

33 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
34 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
35 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
36 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
37 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
38 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
39 construction.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
41 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
42 restoration of grassland and vernal pool that could overlap with the species model, would result in  
43 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of

1 grassland and vernal pool complex could overlap with the species model and would result in the  
2 protection of 1,011 acres of modeled habitat for San Joaquin kit fox.

3 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger  
4 habitat from Alternative 1B would represent an adverse effect as a result of habitat modification and  
5 potential direct mortality of special-status species. However, with habitat protection, restoration,  
6 management, and enhancement associated with CM3, CM8, and CM11, and guided by AMM1–AMM6,  
7 AMM10, AMM24, and AMM37, which would be in place throughout the time period of construction,  
8 and with implementation of Mitigation Measure BIO-162, the impact of Alternative 1B as a whole on  
9 San Joaquin kit fox and American badger would not be significant under CEQA.

#### 10 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

11 A qualified biologist provided by DWR will survey for American badger concurrent with the  
12 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the  
13 biologist will passively relocate badgers out of the work area prior to construction if feasible. If  
14 an active den is detected within the work area, DWR will avoid the den until the qualified  
15 biologist determines the den is no longer active. Dens that are determined to be inactive by the  
16 qualified biologist will be collapsed by hand to prevent occupation of the den between the time  
17 of the survey and construction activities.

#### 18 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 19 **American Badger**

20 Noise and visual disturbances outside the project footprint but within 250 feet of construction  
21 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American  
22 badger habitat. Water conveyance facilities operations and maintenance activities would include  
23 vegetation and weed control, ground squirrel control, canal maintenance, infrastructure and road  
24 maintenance, levee maintenance, and maintenance and upgrade of electrical systems. While  
25 maintenance activities are not expected to remove San Joaquin kit fox and badger habitat, operation  
26 of equipment could disturb small areas of vegetation around maintained structures and could result  
27 in injury or mortality of individual foxes and badgers, if present. Given the remote likelihood of  
28 active San Joaquin kit fox or badger dens in the vicinity of the conveyance facilities, the potential for  
29 this effect is small and would further be minimized with the implementation of seasonal no-  
30 disturbance buffers around occupied dens, and implementation of other measures as described in  
31 AMM1–AMM6, AMM10, AMM24, and AMM37 and Mitigation Measure BIO-162.

32 **NEPA Effects:** Implementation of the AMMs listed above and Mitigation Measure BIO-162, *Conduct*  
33 *Preconstruction Survey for American Badger*, would avoid the potential for substantial adverse  
34 effects on San Joaquin kit fox or American badger, either indirectly or through habitat modifications.  
35 These measures would also avoid and minimize effects that could substantially reduce the number  
36 of San Joaquin kit fox or American badger, or restrict either species' range. Therefore, the indirect  
37 effects of Alternative 1B would not have an adverse effect on San Joaquin kit fox or American badger.

38 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
39 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American  
40 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative  
41 1B construction, operation, and maintenance, the BDCP would avoid the potential for significant  
42 adverse effects on either species, either indirectly or through habitat modifications, and would not  
43 result in a substantial reduction in numbers or a restriction in the range of either species. In

1 addition, Mitigation Measure BIO-162 would reduce the impact of indirect effects of Alternative 1B  
2 on American badger to a less-than-significant level.

3 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

4 Please see Mitigation Measure BIO-162 under Impact BIO-162.

5 **San Joaquin Pocket Mouse**

6 This section describes the effects of Alternative 1B, including water conveyance facilities  
7 construction and implementation of other conservation components, on San Joaquin pocket mouse.  
8 Habitat for this species consists of the grassland natural community throughout the Plan Area. The  
9 species requires friable soils for burrowing.

10 Construction and restoration associated with Alternative 1B conservation measures would result in  
11 both temporary and permanent losses of San Joaquin pocket mouse habitat as indicated in Table 12-  
12 1B-60. Full implementation of Alternative 1B would also include the following conservation actions  
13 over the term of the BDCP that would likely benefit San Joaquin pocket mouse.

- 14 ● Protect at least 8,000 acres of grasslands (Objective GNC1.1, associated with CM3).
- 15 ● Restore at least 2,000 acres of grasslands to connect fragmented patches of protected grasslands  
16 (Objective GNC1.2, associated with CM8).
- 17 ● Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water  
18 availability, soil chemistry, soil texture, topography, and disturbance regimes, with  
19 consideration of historical states (Objective GNC2.1).

20 As explained below, with the restoration or protection of these amounts of habitat, impacts on San  
21 Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant  
22 for CEQA purposes.



1 **Table 12-1B-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 1B**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	400	400	358	358	NA	NA
<b>Total Impacts CM1</b>		<b>400</b>	<b>400</b>	<b>358</b>	<b>358</b>		
CM2-CM18	Grassland	888	2,055	239	274	385-1,277	514
<b>Total Impacts CM2-CM18</b>		<b>888</b>	<b>2,055</b>	<b>239</b>	<b>274</b>	<b>385-1,277</b>	<b>514</b>
<b>TOTAL IMPACTS</b>		<b>1,288</b>	<b>2,455</b>	<b>597</b>	<b>632</b>	<b>385-1,277</b>	<b>514</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**  
5 **Mouse**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss  
7 of up to 3,209 acres of habitat for San Joaquin pocket mouse (of which 2,654 acres would be a  
8 permanent loss and 555 acres would be a temporary loss of habitat, Table 12-1B-60). Conservation  
9 measures that would result in these losses are conveyance facilities and transmission line  
10 construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries  
11 Enhancement (CM2), Tidal Natural Communities Restoration (CM4), Seasonally Inundated  
12 Floodplain Restoration (CM5), Grassland Natural Community Restoration (CM8), Vernal Pool  
13 Natural Community and Alkali Seasonal Wetland Complex Restoration (CM9), Nontidal Marsh  
14 Restoration (CM10), and Conservation Hatcheries (CM18). The majority of habitat loss would result  
15 from CM4. Habitat enhancement and management activities (CM11), which include ground  
16 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
17 addition, maintenance activities associated with the long-term operation of the water conveyance  
18 facilities and other BDCP physical facilities could degrade or eliminate San Joaquin pocket mouse  
19 habitat. Each of these individual activities is described below. A summary statement of the combined  
20 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would  
22 result in the combined permanent and temporary loss of up to 761 acres of potential San  
23 Joaquin pocket mouse habitat (403 acres of permanent loss, 358 acres of temporary loss) in CZ  
24 3-CZ 6, CZ 8, and CZ 9. The majority of grassland that would be removed would be in CZ 8 and  
25 CZ 9, from the construction of the new canals. Refer to the Terrestrial Biology Map Book for a  
26 detailed view of Alternative 1B construction locations. Construction of the forebay would affect

1 the area where there is a record of San Joaquin pocket mouse (California Department of Fish and  
2 Wildlife 2013).

- 3 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
4 (CM2) would permanently remove 261 acres of potential San Joaquin pocket mouse habitat in  
5 the Yolo Bypass in CZ 2. In addition, 165 acres would be temporarily removed. Most of the  
6 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe  
7 Drain/Tule Canal, and along the west side channels.
- 8 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation  
9 and inundation would permanently remove an estimated 1,506 acres of potential San Joaquin  
10 pocket mouse habitat. The majority of the losses would likely occur in the vicinity of Cache  
11 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and  
12 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
13 directly impact and fragment remaining grassland just north of Rio Vista in and around French  
14 and Prospect Islands, and in an area south of Rio Vista around Threemile Slough.
- 15 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
16 seasonally inundated floodplain (CM5) would permanently and temporarily remove  
17 approximately 481 acres of San Joaquin pocket mouse habitat (449 permanent, 32 temporary).  
18 These losses would be expected to occur along the San Joaquin River and other major  
19 waterways in CZ 7.
- 20 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
21 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
22 result from implementation of *CM8* and *CM9* in CZ 1, CZ 8, and CZ 11. However, all areas would  
23 be restored to their original or higher value habitat after the construction periods. The resulting  
24 restoration of 2,000 acres of grassland would benefit San Joaquin pocket mouse.
- 25 • *CM11 Natural Communities Enhancement and Management*: The protection of 8,000 acres of  
26 grassland for covered species is also expected to benefit San Joaquin pocket mouse by protecting  
27 existing habitats from potential loss or degradation that otherwise could occur with future  
28 changes in existing land use. Habitat management and enhancement-related activities could  
29 cause disturbance or direct mortality to San Joaquin pocket mouse if they are present near work  
30 areas.

31 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
32 *and Management* that are designed to enhance wildlife values in restored or protected habitats  
33 could result in localized ground disturbances that could temporarily remove small amounts of  
34 San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative  
35 vegetation and road and other infrastructure maintenance activities, would be expected to have  
36 minor adverse effects on habitat and would be expected to result in overall improvements to  
37 and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from  
38 management-related equipment operation could temporarily displace individuals or alter the  
39 behavior of the species if adjacent to work areas. With full implementation of the BDCP,  
40 enhancement and management actions designed for western burrowing owl would also be  
41 expected to benefit these species. San Joaquin pocket mouse would benefit particularly from  
42 protection of grassland habitat against potential loss or degradation that otherwise could occur  
43 with future changes in existing land use.

- 1       • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San  
2       Joaquin pocket mouse habitat.
- 3       • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
4       water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
5       disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.  
6       Maintenance activities would include vegetation management, levee and structure repair, and  
7       re-grading of roads and permanent work areas. These effects, however, would be reduced by  
8       AMMs and conservation actions as described below.
- 9       • *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket  
10      mouse if present in construction areas.

11      The following paragraphs summarize the combined effects discussed above and describe other  
12      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
13      also included.

#### 14      ***Near-Term Timeframe***

15      Because the water conveyance facility construction is being evaluated at the project level, the near-  
16      term BDCP conservation strategy has been evaluated to determine whether it would provide  
17      sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
18      effects of such conveyance facility construction would not be adverse under NEPA. Alternative 1B  
19      would remove 1,877 acres of San Joaquin pocket mouse habitat (1,354 permanent, 523 temporary)  
20      in the study area in the near-term. One record of San Joaquin pocket mouse near Clifton Court  
21      forebay could be affected by the construction of the new forebay. These effects would result from  
22      the construction of the water conveyance facilities (CM1, 761 acres), and implementing other  
23      conservation measures (Yolo Bypass Fisheries Enhancement [CM2] Tidal Natural Communities  
24      Restoration [CM4], Seasonally Inundated Floodplain Restoration [CM5], Grassland Natural  
25      Community Restoration [CM8], Vernal Pool and Alkali Seasonal Wetland Complex Restoration  
26      [CM9], and Conservation Hatcheries [CM18] 1,116 acres).

27      Typical NEPA project-level mitigation ratios for those natural communities affected by CM1 would  
28      be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,522 acres of  
29      grassland natural communities should be protected to mitigate the CM1 permanent and temporary  
30      effects on 751 acres of San Joaquin pocket mouse habitat. The BDCP has committed to near-term  
31      goals of protecting 2,000 acres and restoring 1,140 acres of grassland natural community in CZ 1, CZ  
32      2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and restoration of grasslands, would result in a  
33      contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
34      would expand habitat for San Joaquin pocket mouse and reduce the effects of current levels of  
35      habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, San  
36      Joaquin pocket mouse would likely benefit from the management of the grasslands for general  
37      wildlife benefit.

38      These natural community biological goals and objectives would inform the near-term protection and  
39      restoration efforts and represent performance standards for considering the effectiveness of  
40      restoration actions for the species. The acres of protection and restoration contained in the near-  
41      term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
42      effects of CM1, especially considering that a large portion of the affected grasslands consists of thin

1 strips of grassland along levees and that areas of grassland protection and restoration would be in  
2 large contiguous blocks.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
4 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
5 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material, and AMM10 Restoration of Temporarily Affected Natural Communities. All of these AMMs*  
8 *include elements that avoid or minimize the risk of affecting habitats and species adjacent to work*  
9 *areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.*

### 10 **Late Long-Term Timeframe**

11 Based on the habitat model, the study area supports approximately 78,624 acres of potential habitat  
12 for San Joaquin pocket mouse. Alternative 1B as a whole would result in the permanent loss of and  
13 temporary effects on 3,209 acres of grasslands that could be suitable for San Joaquin pocket mouse  
14 (4% of the habitat in the study area). The locations of these losses are described above in the  
15 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
16 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11 and to protect 8,000 acres of grassland (with  
17 at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres protected in CZ  
18 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11 in the  
19 study area. All protected habitat would be managed under *CM11 Natural Communities Enhancement*  
20 *and Management.*

21 **NEPA Effects:** In the absence of other conservation actions, the loss of San Joaquin pocket mouse  
22 habitat associated with Alternative 1B would represent an adverse effect as a result of habitat  
23 modification and potential mortality of a special-status species. However, with habitat protection  
24 and restoration associated with CM3, CM8, and CM11, guided by biological goals and objectives and  
25 by AMM1–AMM6, and AMM10 which would be in place throughout the construction period, the  
26 effects of habitat loss and potential mortality under Alternative 1B on San Joaquin pocket mouse  
27 would not be adverse.

28 **CEQA Conclusion:** Alternative 1B (CM1–CM5, and CM11) would have both temporary and  
29 permanent impacts on San Joaquin pocket mouse and its habitat and operation of construction  
30 equipment could disturb individuals, if present in the study area.

### 31 **Near-Term Timeframe**

32 Because the water conveyance facility construction is being evaluated at the project level, the near-  
33 term BDCP conservation strategy has been evaluated to determine whether it would provide  
34 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
35 effects of such conveyance facility construction would be less than significant under CEQA.  
36 Alternative 1B would remove 1,877 acres of modeled (1,354 permanent, 523 temporary) habitat for  
37 San Joaquin pocket mouse in the study area in the near-term. One record of San Joaquin pocket  
38 mouse near Clifton Court forebay could be affected by the construction of the new forebay. These  
39 effects would result from the construction of the water conveyance facilities (CM1, 761 acres), and  
40 implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal*  
41 *Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM8 Grassland*  
42 *Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,*  
43 *and CM18 Conservation Hatcheries—1,116 acres).*

1 Typical CEQA project-level mitigation ratios for those natural communities affected by CM1 would  
2 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,522 acres of  
3 grassland natural communities should be protected to mitigate the CM1 losses of 645 acres of San  
4 Joaquin pocket mouse habitat.

5 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
6 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and  
7 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,  
8 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and  
9 reduce the effects of current levels of habitat fragmentation. Under CM11 Natural Communities  
10 Enhancement and Management, San Joaquin pocket mouse would likely benefit from the  
11 management of the grasslands for general wildlife benefit.

12 These natural community biological goals and objectives would inform the near-term protection and  
13 restoration efforts and represent performance standards for considering the effectiveness of  
14 restoration actions for the species. The acres of protection and restoration contained in the near-  
15 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
16 effects of CM1, especially considering that a large portion of the affected grasslands consists of thin  
17 strips of grassland along levees and that areas of grassland protection and restoration would be in  
18 large contiguous blocks.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs  
24 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
25 areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

26 These commitments are more than sufficient to support the conclusion that the near-term effects of  
27 Alternative 1B would be less than significant under CEQA.

### 28 ***Late Long-Term Timeframe***

29 Based on the habitat model, the study area supports approximately 78,624 acres of potential habitat  
30 for San Joaquin pocket mouse. Alternative 1B as a whole would result in the permanent loss of and  
31 temporary effects on 3,209 acres of grasslands that could be suitable for San Joaquin pocket mouse  
32 (4% of the habitat in the study area). The locations of these losses are described above in the  
33 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
34 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11 and to protect 8,000 acres of grassland (with  
35 at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres protected in CZ  
36 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11 in the  
37 study area. All protected habitat would be managed under *CM11 Natural Communities Enhancement*  
38 *and Management*.

39 Considering these protection and restoration provisions, which would provide acreages of new  
40 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction  
41 and restoration activities, and with implementation of AMM1–AMM6, and AMM10, the loss of  
42 habitat or direct mortality through implementation of Alternative 1B would not result in a  
43 substantial adverse effect through habitat modifications and would not substantially reduce the

1 number or restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or potential  
2 mortality under this alternative would have a less-than-significant impact on San Joaquin pocket  
3 mouse.

#### 4 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

5 Construction activities associated with water conveyance facilities, conservation components and  
6 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
7 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
8 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and  
9 its habitat over the term of the BDCP. These potential effects would be minimized and avoided  
10 through AMM1–AMM6, and AMM10, which would be in effect throughout the plan’s construction  
11 phase.

12 Water conveyance facilities operations and maintenance activities would include vegetation and  
13 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
14 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
15 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb  
16 small areas of vegetation around maintained structures and could result in injury or mortality of  
17 individual pocket mice, if present.

18 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial  
19 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.  
20 These measures would also avoid and minimize effects that could substantially reduce the number  
21 of San Joaquin pocket mouse, or restrict the species’ range. Therefore, the indirect effects of  
22 Alternative 1B would not have an adverse effect on San Joaquin pocket mouse.

23 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
24 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With  
25 implementation of AMM1–AMM6, and AMM10, as part of Alternative 1B construction, operation,  
26 and maintenance, the BDCP would avoid the potential for significant adverse effects on either  
27 species, either indirectly or through habitat modifications, and would not result in a substantial  
28 reduction in numbers or a restriction in the range of the species. Therefore, the indirect effects  
29 under this alternative would have a less-than-significant impact on San Joaquin pocket mouse.

#### 30 **Special-Status Bat Species**

31 Special-status bat species with potential to occur in the study area employ varied roost strategies,  
32 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as  
33 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,  
34 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats  
35 roosting habitat includes valley/foothill riparian natural community, developed lands and  
36 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all  
37 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

38 There is potential for at least thirteen different bat species to be present in the study area (Figure  
39 12-51), including four California species of special concern and nine species ranked from low to  
40 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A, *Special-Status*  
41 *Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that  
42 involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats(see

1 Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report for  
2 details on methods and results, and Table 12A-2 in Appendix 12A).

3 The majority of the parcels assessed during field surveys contained bat foraging and roosting  
4 features and were considered highly suitable habitat. At the time of the 2009 field surveys, DWR  
5 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not  
6 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was  
7 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was  
8 observed at 26 of the bridges. Biologists observed Mexican free-tailed bats at four of the bridges and  
9 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,  
10 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second  
11 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

12 The remaining 89 bridges contained structural features that were considered conducive to  
13 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more  
14 often have box beams or other less protected roosting spots where bats rest temporarily while  
15 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where  
16 bats are protected from predators and weather. Seventeen bridges in the survey area had no  
17 potential for roosting because they lacked surface features from which bats could hang and offered  
18 no protection from weather or predators.

19 Construction and restoration associated with Alternative 1B conservation measures would result in  
20 both temporary and permanent losses of foraging and roosting habitat for special-status bats as  
21 indicated in Table 12-1B-61. Protection and restoration for special-status bat species focuses on  
22 habitats and does not include manmade structures such as bridges. The conservation measures that  
23 would be implemented to achieve the biological goals and objectives that would also benefit special-  
24 status bats are summarized below.

- 25 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated  
26 with CM3). This objective includes protecting and restoring a variety of habitat types described  
27 below (BDCP Chapter 3, Table 3.3-2).
  - 28 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
29 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
  - 30 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with CM3).
  - 31 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
  - 32 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and  
33 CM11).
  - 34 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and  
35 CM11).
  - 36 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant  
37 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
  - 38 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
39 GNC1.2, associated with CM3 and 8).
  - 40 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and 9).

- 1           ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated
- 2           with CM2, 3, and 4).
- 3           ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective
- 4           VFRNC1.1, associated with CM3 and CM7).
- 5           ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
- 6           (Objective VFRNC1.2, associated with CM3).

7 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 8 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse  
 9 for NEPA purposes and would be less than significant for CEQA purposes.

10 **Table 12-1B-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with**  
 11 **Alternative 1B (acres) <sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Roosting	474	474	322	322	NA	NA
	Foraging	8,572	8,572	13,255	13,255	NA	NA
<b>Total Impacts CM1</b>		<b>9,046</b>	<b>9,046</b>	<b>13,577</b>	<b>13,577</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
<b>Total Impacts CM2-CM18</b>		<b>15,021</b>	<b>61,969</b>	<b>940</b>	<b>2,338</b>	<b>21,589</b>	<b>10,548</b>
<b>TOTAL IMPACTS</b>		<b>24,067</b>	<b>71,015</b>	<b>14,517</b>	<b>15,915</b>	<b>21,589</b>	<b>10,548</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Affected roosting habitat acreages include valley/foothill riparian habitat and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as the maximum possible based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

12

13 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

14 Alternative 1B conservation measure CM1 would result in the permanent and temporary loss  
 15 combined of up to 796 acres of roosting habitat and 21,827 acres of foraging habitat for special-  
 16 status bats in the study area. DWR identified three bridges as potential night roosting that could be  
 17 affected by construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements



1 (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5) would result in the  
2 permanent and temporary loss of 1,782 acres of roosting habitat and the conversion of  
3 approximately 65,525 acres of foraging habitat from mostly cultivated lands and managed wetlands  
4 to tidal and nontidal wetlands. Foraging habitat effects for CM2-CM18 were not considered adverse  
5 as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another  
6 foraging habitat (wetlands). Habitat enhancement and management activities (CM11) could result in  
7 local adverse effects. In addition, maintenance activities associated with the long-term operation of  
8 the water conveyance facilities and other BDCP physical facilities could affect special-status bat  
9 habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follow the  
10 individual conservation measure discussions.

- 11 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would  
12 result in the permanent loss of approximately 474 acres of roosting habitat and 8,572 acres of  
13 foraging habitat in the study area. Development of the water conveyance facilities would also  
14 result in the temporary removal of up to 322 acres of roosting habitat and up to 13,255 acres of  
15 foraging habitat for special-status bats in the study area (Table 12-1B-61). DWR identified three  
16 bridges with potential night roosting habitat for bats; one is in a new bridge construction area,  
17 the other two are within the railroad work area that could be affected by construction for CM1.
- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
19 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be  
20 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and  
21 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony  
22 of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be  
23 affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct*  
24 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that  
25 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 26 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
27 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into  
28 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting  
29 habitat for special-status bats would permanently affected. This habitat is of low value,  
30 consisting of a small, isolated patch surrounded by cultivated lands, and the species has a  
31 relatively low likelihood of being present in these areas. The roosting habitat that would be  
32 removed consists of relatively small and isolated patches along canals and irrigation ditches  
33 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small  
34 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*  
35 *Surveys for Roosting Bats and Implement Protective Measures*, described below, requires that  
36 tidal natural communities restoration avoid effects on roosting special-status bats.
- 37 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
38 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into  
39 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent  
40 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status  
41 bats in the study area.
- 42 • *CM11 Natural Communities Enhancement and Management*: Implementation of Alternative 1B  
43 would result in an overall benefit to special-status bats within the study area through protection  
44 and restoration of their foraging and roosting habitats. The majority of affected acres would  
45 convert agricultural land to natural communities with higher potential foraging and roosting

1 value, such as riparian, tidal and nontidal wetlands, and periodically inundated lands.  
2 Implementation of Restored foraging habitats primarily would replace agricultural lands.  
3 Restored habitats are expected to be of higher function because the production of flying insect  
4 prey species is expected to be greater in restored wetlands and uplands on which application of  
5 pesticides would be reduced relative to affected agricultural habitats. Noise and visual  
6 disturbances during implementation of riparian habitat management actions could result in  
7 temporary disturbances that, if bat roost sites are present, could cause temporary abandonment  
8 of roosts. This effect would be minimized with implementation of Mitigation Measure BIO-166,  
9 *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures.*

- 10 ● Operations and maintenance: Ongoing facilities operation and maintenance is expected to have  
11 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of  
12 the above-ground water conveyance facilities and restoration infrastructure could result in  
13 ongoing but periodic disturbances that could affect special-status bat use of the surrounding  
14 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ  
15 4, CZ 5, CZ 6, CZ 7 and CZ 8). Maintenance activities would include vegetation management,  
16 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
17 however, would be minimized with implementation of the mitigation measure described below.
- 18 ● Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,  
19 such as grading, the movement of construction vehicles or heavy equipment, and the installation  
20 of water conveyance facilities components and new transmission lines, may result in the direct  
21 mortality, injury, or harassment of roosting special-status bats. Construction activities related to  
22 conservation components could have similar affects. Preconstruction surveys would be  
23 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed  
24 while bats are present, as described below in the mitigation measure.

25 The following paragraphs summarize the combined effects discussed above and describe other  
26 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are  
27 also included.

### 28 ***Near-Term Timeframe***

29 Because water conveyance facilities construction is being evaluated at the project level, the near-  
30 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
31 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
32 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land  
33 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and  
34 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses of roosting  
35 habitat under CM1, CM2, and CM4.

36 Alternative 1B would permanently or temporarily affect 1,487 acres of roosting habitat for special-  
37 status bats in the near-term as a result of implementing CM1 (796 acres roosting habitat), CM2 (256  
38 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in  
39 the late long-term. Most of the roosting habitat losses would occur in the valley/foothill riparian  
40 natural community.

41 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
42 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian

1 natural community. Using these ratios would indicate that 1,487 acres of riparian habitat should be  
2 restored and 1,487 acres of riparian habitat should be protected.

3 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status  
4 bats within the study area through protection and restoration of their foraging and roosting habitats  
5 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
6 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities  
7 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
8 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
9 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
10 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
11 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored  
12 habitats are expected to be of higher function because the production of flying insect prey species is  
13 expected to be greater in restored wetlands and uplands on which application of pesticides would  
14 be reduced relative to affected agricultural habitats. Conservation components in the near-term  
15 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1B.

16 In addition, activities associated with natural communities enhancement and protection and with  
17 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
18 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
19 described below, requires preconstruction surveys to reduce these effects.

20 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. These AMMs include  
25 elements that avoid or minimize the risk of construction activity affecting habitat and species  
26 adjacent to work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C,  
27 *Avoidance and Minimization Measures*.

### 28 ***Late Long-Term Timeframe***

29 Alternative 1B as a whole would affect 2,578 acres of roosting habitat (Table 12-1B-61). Because the  
30 majority of affected acres would convert agricultural land to natural communities with higher  
31 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
32 inundated lands this analysis focuses only on losses of roosting habitat under CM1, CM2, CM4, and  
33 CM5.

34 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
35 status bats within the study area through protection and restoration of approximately 142,200 acres  
36 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
37 protect the highest quality natural communities and covered species habitat in the Plan Area to  
38 optimize the ecological value of the reserve system for conserving covered species and native  
39 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
40 community acreage targets. Achieving this objective is intended to protect and restore natural  
41 communities, species-specific habitat elements, and species diversity on a landscape-scale.,  
42 Achieving this objective is also intended to conserve representative natural and seminatural  
43 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
44 ecosystem function, and biological diversity.

1 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
2 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
3 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
4 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
5 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored  
6 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
7 higher function because the production of flying insect prey species is expected to be greater in  
8 restored wetlands and uplands on which application of pesticides would be reduced relative to  
9 affected agricultural habitats.

10 Should any of the special-status bat species be detected roosting in the study area, construction of  
11 water conveyance facilities and restoration activities would have an adverse effect on roosting  
12 special-status bats. Noise and visual disturbances and the potential for injury or mortality of  
13 individuals associated within implementation of the restoration activities on active roosts would be  
14 minimized with implementation of Mitigation Measure BIO-166. Conservation components would  
15 sufficiently offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and  
16 CM5.

17 **NEPA Effects:** In the near-term the losses of roosting habitat for special-status bats associated with  
18 implementing Alternative 1B are not expected to result in substantial adverse effects on special-  
19 status bats, either directly or through habitat modifications, and would not result in a substantial  
20 reduction in numbers or a restriction in the range of special-status bats because the BDCP has  
21 committed to protecting the acreage required to meet the typical mitigation ratios described above.  
22 In the late long-term, the losses of roosting habitat for special-status bats associated with  
23 Alternative 1B, in the absence of other conservation actions, would represent an adverse effect as a  
24 result of habitat modification and potential direct mortality of special-status species. However, with  
25 habitat protection and restoration associated with the conservation components, guided by  
26 landscape-scale goals and objectives and by AMM1–AMM6, and AMM10, and with implementation of  
27 Mitigation Measure BIO-166, the effects of Alternative 1B as a whole on special-status bats would  
28 not be adverse.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
33 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
34 be less than significant under CEQA. Because the majority of affected acres would convert  
35 agricultural land to natural communities with higher potential foraging and roosting value, such as  
36 riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses only on  
37 losses to roosting habitat for CM1, CM2, and CM4 in the near-term.

38 Alternative 1B would permanently or temporarily affect 1,487 acres of roosting habitat for special-  
39 status bats in the near-term as a result of implementing CM1 (796 acres roosting habitat), CM2 (256  
40 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in  
41 the late long-term. Most of the roosting habitat losses would occur in the valley/foothill riparian  
42 natural community.

1 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
2 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
3 natural community. Using these ratios would indicate that 1,487 acres of riparian habitat should be  
4 restored and 1,487 acres of riparian habitat should be protected.

5 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status  
6 bats within the study area through protection and restoration of their foraging and roosting habitats  
7 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
8 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities  
9 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
10 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
11 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
12 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
13 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored  
14 habitats are expected to be of higher function because the production of flying insect prey species is  
15 expected to be greater in restored wetlands and uplands on which application of pesticides would  
16 be reduced relative to affected agricultural habitats. Conservation components in the near-term  
17 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1B.

18 In addition, activities associated with natural communities enhancement and protection and with  
19 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
20 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
21 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant  
22 level.

23 The permanent loss of roosting habitat from Alternative 1B would be mitigated through  
24 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact  
25 under CEQA on roosting special-status bats, either directly or through habitat modifications and no  
26 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also  
27 contains commitments to implement AMM1–AMM6 and AMM10. These AMMs include elements that  
28 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work  
29 areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and*  
30 *Minimization Measures*.

### 31 ***Late Long-Term Timeframe***

32 Alternative 1B as a whole would affect 2,578 acres of roosting habitat (Table 12-1B-61). Because the  
33 majority of affected acres would convert agricultural land to natural communities with higher  
34 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
35 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
36 in the late long-term.

37 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
38 status bats within the study area through protection and restoration of approximately 142,200 acres  
39 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
40 protect the highest quality natural communities and covered species habitat in the Plan Area to  
41 optimize the ecological value of the reserve system for conserving covered species and native  
42 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
43 community acreage targets. Achieving this objective is intended to protect and restore natural  
44 communities, species-specific habitat elements, and species diversity on a landscape-scale.,

1 Achieving this objective is also intended to conserve representative natural and seminatural  
2 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
3 ecosystem function, and biological diversity.

4 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
5 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
6 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
7 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
8 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored  
9 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
10 higher function because the production of flying insect prey species is expected to be greater in  
11 restored wetlands and uplands on which application of pesticides would be reduced relative to  
12 affected agricultural habitats.

13 Should any of the special-status bat species roost in the study area, construction of water  
14 conveyance facilities and restoration activities would have an adverse effect on roosting special-  
15 status bats. Noise and visual disturbances and the potential injury or mortality of individuals as a  
16 result of implementation of the Alternative 1B activities would be minimized with implementation  
17 of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement*  
18 *Protective Measures*. Conservation components would sufficiently offset the adverse effects resulting  
19 from late long-term effects from CM1, CM2, CM4, and CM5.

20 The permanent loss of roosting habitat resulting from Alternative 1B would be mitigated through  
21 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact  
22 under CEQA on roosting special-status bats, either directly or through habitat modifications, and no  
23 substantial reduction in numbers or a restriction in the range of special-status bats. Therefore,  
24 Alternative 1B would not result in a significant impact on special-status bats under CEQA.

#### 25 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and** 26 **Implement Protective Measures**

27 The following measure was designed to avoid and minimize adverse effects on special-status  
28 bats. However, baseline data are not available or are limited on how bats use the study area, and  
29 on individual numbers of bats and how they vary seasonally. Therefore, it is difficult to  
30 determine if there would be a substantial reduction in species numbers. Bat species with  
31 potential to occur in the study area employ varied roost strategies, from solitary roosting in  
32 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and  
33 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest  
34 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include  
35 these components.

- 36 • Identification of potential roosting habitat within project area.
- 37 • Daytime search for bats and bat sign in and around identified habitat.
- 38 • Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or  
39 active full-spectrum acoustic monitoring where species identification is sought.
- 40 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from  
41 dusk to dawn over multiple nights.

- Additional on-site night surveys as needed following passive acoustic detection of special status bats to determine nature of bat use of the structure in question (e.g., use of structure as night roost between foraging bouts).
- Qualified biologists will have knowledge of the natural history of the species that could occur in the study area and experience using full-spectrum acoustic equipment. During surveys, biologists will avoid unnecessary disturbance of occupied roosts.

#### ***Preconstruction Bridges and Other Structure Surveys***

Before work begins on the bridge/structure, qualified biologists will conduct a daytime search for bat sign and evening emergence surveys to determine if the bridge/structure is being used as a roost. Biologists conducting daytime surveys would listen for audible bat calls and would use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes, and other bridge features that could house bats. Bridge surfaces and the ground around the bridge/structure would be surveyed for bat sign, such as guano, staining, and prey remains.

Evening emergence surveys will consist of at least one biologist stationed on each side of the bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after sunset for a minimum of two nights within the season that construction would be taking place. Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence surveys to assist in species identification. All emergence surveys would be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted).

Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in determining species present. A minimum of four nights of acoustic monitoring surveys will be conducted within the season that the construction would be taking place. If site security allows, detectors should be set to record bat calls for the duration of each night. To the extent possible, all monitoring will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). The biologists will analyze the bat call data using appropriate software and prepare a report with the results of the surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost, biologists will conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to determine if the bridge is serving as a colonial night roost.

If suitable roost structures would be removed, additional surveys may be required to determine how the structure is used by bats, whether it is as a night roost, maternity roosts, migration stopover, or for hibernation.

#### ***Preconstruction Tree Surveys***

If tree removal or trimming is necessary, qualified biologists will examine trees to be removed or trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities, basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be identified and the area around these features searched for bats and bat sign (guano, culled insect parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should be considered potential habitat for solitary foliage roosting bat species.

If bat sign is detected, biologists will conduct evening visual emergence survey of the source habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two

1 nights within the season that construction would be taking place. Methodology should follow  
2 that described above for the bridge emergence survey.

3 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector  
4 will be used to assist in determining species present. These surveys would be conducted in  
5 coordination with the acoustic monitoring conducted for the bridge/structure.

6 ***Protective Measures for Bats using Bridges/Structures and Trees***

7 Avoidance and minimization measures may be necessary if it is determined that bats are using  
8 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during  
9 acoustic monitoring. Appropriate measures will be determined in coordination with CDFW and  
10 may include measures listed below.

- 11 ● Disturbance of the bridge will be avoided between April 15 and September 15 (the  
12 maternity period) to avoid impacts on reproductively active females and dependent young.
- 13 ● Installation of exclusion devices from March 1 through April 14 or September 15 through  
14 October 30 to preclude bats from occupying the bridge during construction. Exclusionary  
15 devices will only be installed by or under the supervision of an experienced bat biologist.
- 16 ● Tree removal will be avoided between April 15 and September 15 (the maternity period) to  
17 avoid impacts on pregnant females and active maternity roosts (whether colonial or  
18 solitary).
- 19 ● All tree removal would be conducted between September 15 and October 30, which  
20 corresponds to a time period when bats would not likely have entered winter hibernation  
21 and would not be caring for flightless young. If weather conditions remain conducive to  
22 regular bat activity beyond October 30<sup>th</sup>, later tree removal may be considered in  
23 consultation with CDFW.
- 24 ● Trees would be removed in pieces, rather than felling the entire tree.
- 25 ● If a maternity roost is located, whether solitary or colonial, that roost will remain  
26 undisturbed with a buffer as determined in consultation with CDFW until September 15 or  
27 until a qualified biologist has determined the roost is no longer active.
- 28 ● If a non-maternity roost is found, that roost will be avoided and an appropriate buffer  
29 established in consultation with CDFW. Every effort should be made to avoid the roost, as  
30 methods to evict bats from trees are largely untested. However, if the roost cannot be  
31 avoided, eviction would be attempted and procedures designed in consultation with CDFW  
32 to reduce the likelihood of mortality of evicted bats. In all cases:
  - 33 ○ Eviction will not occur before September 15<sup>th</sup> and will match the timeframe for tree  
34 removal approved by CDFW.
  - 35 ○ Qualified biologists will carry out or oversee the eviction tasks monitor the tree  
36 trimming/removal.
  - 37 ○ Eviction will take place late in the day or in the evening to reduce the likelihood of  
38 evicted bats falling prey to diurnal predators.
  - 39 ○ Eviction will take place during weather and temperature conditions conducive to bat  
40 activity.



- Special-status bat roosts will not be disturbed.

Eviction procedures may include but are not limited to:

- Pre-eviction surveys to obtain data to inform the eviction approach and subsequent mitigation requirements. Relevant data may include the species, sex, reproductive status and/or number of bats using the roost, and roost conditions themselves such as temperature and dimensions. Surveys may include visual emergence, night vision, acoustic, and/or capture.
- Structural changes may be made to the roost, performed without harming bats, such that the conditions in the roost are undesirable to roosting bats and the bats leave on their own (e.g., open additional portals so that temperature, wind, light and precipitation regime in the roost change).
- Noninjurious harassment at the roost site to encourage bats to leave on their own, such as ultrasound deterrents or other sensory irritants.
- Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and several minutes should pass before felling trees or trimming limbs to allow bats time to arouse and leave the tree. The biologists should search downed vegetation for dead and injured bats. The presence of dead or injured bats would be reported to CDFW.

Compensatory mitigation for the loss of roosting habitat will also be determined through consultation with CDFW and may include the construction and installation of suitable replacement habitat onsite. Depending on the species and type of roost lost, various roost replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural habitat onsite is generally preferable to artificial.

Artificial roosts are often unsuccessful, and care must be taken to determine as closely as possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record but information is mounting on how to create successful houses. There is no single protocol or recipe for bat-house success. Careful study of the roost requirements of the species in question; the particular conditions at the lost roost site including temperature, orientation of the openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase the chances of designing a successful replacement.

Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat activity has been positively correlated with increased vegetation and tree growth, canopy complexity and restoration acreage at cottonwood-willow restoration sites along the Lower Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide a wider range of bat species with preferred roost types, including both foliage-roosting and crevice-/cavity-roosting bats.

1 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

2 Construction activities associated with water conveyance facilities, conservation components and  
3 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
4 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
5 postconstruction disturbances and noise with localized effects on special-status bats and their  
6 roosting habitat over the term of the BDCP.

7 Water conveyance facilities operations and maintenance activities would include vegetation and  
8 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
9 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
10 activities are not expected to remove special-status bat habitat, operation of equipment could  
11 disturb small areas of vegetation around maintained structures and could result in disturbances to  
12 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting  
13 Bats and Implement Protective Measures*, is available to address these adverse effects.

14 Increased exposure to methylmercury associated with tidal natural communities restoration would  
15 potentially indirectly affect special-status bat species. *CM12 Methylmercury Management* describes  
16 the process by which tidal natural communities restoration may increase methyl mercury levels in  
17 wetlands in the study area. Mercury has been found in high concentrations in some bat species, such  
18 as the Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid  
19 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are  
20 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP  
21 tidal natural communities restoration.

22 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would  
23 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or  
24 through habitat modifications. This mitigation measure would also avoid and minimize effects that  
25 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,  
26 the indirect effects of Alternative 1B would not have an adverse effect on special-status bats.

27 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as  
28 well as construction-related noise and visual disturbances could have a significant impact on  
29 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure  
30 BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*,  
31 would reduce this impact to a less-than-significant level and ensure Alternative 1B would not result  
32 in a substantial reduction in numbers or a restriction in the range of species.

33 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and  
34 Implement Protective Measures**

35 See Mitigation Measure BIO-166 under Impact BIO-166.

36 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of  
37 Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
39 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study  
40 area (Table 12-1B-61).

1 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of  
2 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-1B-61).  
3 Potential roosting trees are likely to be retained within seasonally flooded areas, although high  
4 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging  
5 habitat for the species. The overall effect of seasonal inundation in existing riparian natural  
6 communities may instead be beneficial. Historically, flooding was the main natural disturbance  
7 regulating ecological processes in riparian areas, and flooding promotes the germination and  
8 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas  
9 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat  
10 for special-status bats that use riparian habitats.

11 **NEPA Effects:** Periodic effects on roosting and foraging habitat for special-status bats associated  
12 with implementing Alternative 1B are not expected to result in substantial adverse effects on  
13 special-status bats, either directly or through habitat modifications and would not result in a  
14 substantial reduction in numbers or a restriction in the range of special-status bats. Mitigation  
15 Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective*  
16 *Measures*, is available to address any effects of periodic inundation on special-status bats and  
17 roosting habitat. Therefore, Alternative 1B would not adversely affect the species.

18 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would  
19 periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact  
20 of periodic inundation on special-status bats would be mitigated through implementation of  
21 Mitigation Measure BIO-166, which would ensure there is no significant impact on roosting special-  
22 status bats, either directly or through habitat modifications and no substantial reduction in numbers  
23 or a restriction in the range of special-status bats.

24 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
25 **Implement Protective Measures**

26 See Mitigation Measure BIO-166 under Impact BIO-166.

27 **Plant Species**

28 **Vernal Pool Plants**

29 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in  
30 the study area (Tables 12-2, 12-3, summarized in Table 12-1B-62). The vernal pool habitat model  
31 used for the impact analysis was based on vegetation types and associations from various data sets  
32 which were used to create maps showing the distribution of vernal pool habitat in the study area  
33 according to three habitat types in which the species are known to occur, including vernal pool  
34 complex and degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool  
35 complex habitat consists of vernal pools and uplands that display characteristic vernal pool and  
36 swale visual signatures that have not been significantly impacted by agricultural or development  
37 practices. Degraded vernal pool complex habitat consists of habitat that ranges from areas with  
38 vernal pool and swale visual signatures that display clear evidence of significant disturbance due to  
39 plowing, discing, or leveling to areas with clearly artificial basins such as shallow agricultural  
40 ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in  
41 the degraded vernal pool complex are inundated during the wet season and may have historically  
42 been located in or near areas with natural vernal pool complex, they may support individuals or

1 small populations of species that are found in vernal pools and swales. However, they do not possess  
2 the full complement of ecosystem and community characteristics of natural vernal pools, swales and  
3 their associated uplands and they are generally ephemeral features that are eliminated during the  
4 course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was  
5 included in the model because alkaline vernal pools are also present in some areas mapped as alkali  
6 seasonal wetland.

7 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat  
8 affinities, and because vernal pool habitat within the study area is highly heterogeneous with  
9 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly  
10 overestimates the extent of habitat in the study area occupied by each species. However, the vernal  
11 pool habitat model is likely to encompass all or most of the potential area within which special-  
12 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent  
13 of occupied habitat or to underestimate the effects of Alternative 1B.

14 Full implementation of Alternative 1B would include the following conservation actions over the  
15 term of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3, Section 3.3, *Effects on*  
16 *Covered Wildlife and Plant Species*).

- 17 • Protect two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills or  
18 Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- 19 • Maintain no net loss of Heckard's peppergrass in Conservation Zones 1, 8, or 11 within  
20 restoration sites or within the area of affected tidal range of restoration projects (Objective  
21 VPP1.2, associated with CM3 and CM9).

22 The construction and restoration activities covered under Alternative 1B could have impacts on  
23 special-status vernal pool plants. Modeled vernal pool habitat is within the proposed footprint for  
24 the Alternative 1B water conveyance facilities and within the hypothetical footprints for restoration  
25 activities, although no known occurrences of the 17 covered and noncovered vernal pool plant  
26 species is within the proposed footprint for the Alternative 1B water conveyance facilities or the  
27 footprint for restoration activities. Table 12-1B-62 summarizes the acreage of modeled vernal pool  
28 habitat in the study area, the number of occurrences of each special-status vernal pool plant in the  
29 study area, and potential effects.

1 **Table 12-1B-62. Summary of Impacts on Vernal Pool Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Modeled Habitat</b>					
Vernal pool complex	9,557	2	0	0	Habitat loss from tidal restoration
Degraded vernal pool complex	2,567	373	0	0	Habitat loss from construction of water conveyance facilities and tidal restoration
Alkali seasonal wetland	188	0	0	0	None
<b>Total</b>	<b>12,312</b>	<b>375</b>	<b>0</b>	<b>0</b>	
<b>Covered Species</b>					
Alkali milk-vetch	0	0	16	0	None
Dwarf downingia	0	0	12	0	None
Boggs Lake hedge-hyssop	0	0	1	0	None
Legenere	0	0	8	0	None
Heckard's peppergrass	0	0	4 <sup>a</sup>	0	None
<b>Noncovered Species</b>					
Ferris' milk-vetch	0	0	6	0	None
Vernal pool smallscale	0	0	2	0	None
Hogwallow starfish	0	0	0	0	None
Ferris' goldfields	0	0	4	0	None
Contra Costa goldfields	0	0	7	0	None
Cotula-leaf navarretia	0	0	5	0	None
Baker's navarretia	0	0	3	0	None
Colusa grass	0	0	1	0	None
Bearded popcorn-flower	0	0	5	0	None
Delta woolly marbles	0	0	3	0	None
Saline clover	0	0	9	0	None
Solano grass	0	0	1	0	None

<sup>a</sup> One additional occurrence is in alkali seasonal wetlands.

2

3 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

4 Alternative 1B could affect habitat for special-status vernal pool plants. The individual effects of  
5 each relevant conservation measure are addressed below. A summary statement of the combined  
6 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 7
- 8 • *CM1 Water Facilities and Operations*: Four acres of modeled habitat would be removed by  
9 construction of the water conveyance facilities. However, no known occurrences of the 17  
10 special-status vernal pool plants are within the proposed footprint for the Alternative 1B water  
conveyance facilities. Because the proposed footprint for the Alternative 1B water conveyance

1 facilities affects very little modeled habitat, effects on undiscovered occurrences of special-  
2 status vernal pool plant species are highly unlikely.

- 3 ● *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known  
4 occurrences of special-status vernal pool plants are within the hypothetical footprint for  
5 construction or operation of the Yolo Bypass fisheries enhancements.
- 6 ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered  
7 vernal pool plants by protecting 600 acres of vernal pool complex in CZ 1, CZ 8, and CZ 11  
8 (Objective VPNC1.1). The protected vernal pool habitat would be managed and enhanced to  
9 sustain populations of native vernal pool species. These benefits also would accrue to any  
10 noncovered vernal pool plants occurring in the protected vernal pool complex.
- 11 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the  
12 inundation of 373 acres of vernal pool complex and would, therefore, potentially affect special-  
13 status vernal pool plants. However, most of this habitat (373 acres) consists of degraded vernal  
14 pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of critical  
15 habitat for Contra Costa goldfields could be affected. No known occurrences of covered and  
16 noncovered vernal pool plants would be affected by tidal restoration.
- 17 ● *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of  
18 special-status vernal pool plants are present within areas proposed for floodplain restoration.  
19 Therefore, floodplain restoration and construction of new floodplain levees would have no  
20 impacts on covered and noncovered vernal pool plants.
- 21 ● *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status  
22 vernal pool plants are present within areas proposed for channel margin habitat enhancement.  
23 Therefore, channel margin habitat enhancement would have no impacts on covered and  
24 noncovered vernal pool plants.
- 25 ● *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-  
26 status vernal pool plants are present within areas proposed for riparian habitat enhancement.  
27 Therefore, riparian habitat enhancement would have no impacts on covered and noncovered  
28 vernal pool plants.
- 29 ● *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat  
30 includes grassland matrix within which the vernal pools occur, grassland restoration activities  
31 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
32 that are not included within vernal pool complex habitat. Therefore, grassland communities  
33 restoration would have no impacts on covered and noncovered vernal pool plants.
- 34 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen  
35 circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be  
36 implemented to compensate for that loss. Because vernal pool complex restoration would focus  
37 on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the  
38 likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool  
39 restoration potentially could adversely affect remnant populations of special-status vernal pool  
40 plants or potentially affect vernal pool habitat adjacent to the restoration areas.
- 41 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
42 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool  
43 habitat and would have no impacts on covered and noncovered vernal pool plants.

- *CM22 Avoidance and Minimization Measures*: Effects on covered vernal pool plants potentially resulting from implementation of CM4 would be avoided or minimized through *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM12 Vernal pool Crustaceans*, and *AMM12 Vernal Pool Crustaceans*. AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of existing vernal pools. In addition, AMM11 specifies that individual projects be designed to avoid critical habitat for listed plant and wildlife vernal pool species. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more than 20 wetted acres through the life of the Plan. AMM12 also requires that that tidal natural communities restoration or other ground-disturbing covered activities in Conservation Zones 1 and 11 will not result in the adverse modification of primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat for Contra Costa goldfields, where it overlaps with critical habitat for these vernal pool crustaceans. AMM37 requires that new recreation trails avoid populations of covered vernal pool plants.

In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This includes protecting two occurrences of alkali milkvetch (Objective VPP1.1) and requiring no net loss of Heckard's peppergrass (Objective VPP1.2).

In summary, no adverse effects on covered special-status vernal pool plants would be expected from implementing Alternative 1B. No known occurrences of special-status vernal pool plants would be affected. Beneficial effects on special-status vernal pool plants could occur by protecting 600 acres of vernal pool complex in CZ 1, CZ 8, and CZ 11 and by protecting occurrences of alkali milk-vetch.

The GIS analysis estimated that up to 375 acres of vernal pool complex could be adversely affected by covered activities under Alternative 1B. However, the actual effect on habitat for special-status vernal pool plants is expected to be much less than the estimated impact because the BDCP limits the total loss of wetted vernal pool habitat resulting from specific projects to 10 acres (approximately 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration would be required to compensate for the loss of modeled habitat for special-status vernal pool plants (Objective VPNC1.2, associated with CM9). This would be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts. The limitation on the loss of wetted vernal pool habitat would constrain the implementation of tidal restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

**NEPA Effects:** The loss of modeled habitat for vernal pool plant species would be minimized by AMM12 and offset through CM9. Therefore, Alternative 1B would not result in adverse effects on covered and noncovered vernal pool plant species.

**CEQA Conclusion:** Because loss of modeled habitat for covered vernal pool plants would be offset through restoration, and because impacts on occurrences of covered vernal pool plants would be avoided, the impacts of implementing Alternative 1B on covered and noncovered special-status vernal pool plants in the study area would be less than significant. No mitigation is required.

1       **Alkali Seasonal Wetland Plants**

2       Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area  
3       (Tables 12-2, 12-3, summarized in Table 12-1B-63). Alkali seasonal wetland habitat was modeled  
4       separately for four covered plant species occurring in seasonal alkali wetlands.

5       The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin  
6       spearscale habitat in the study area according to the species' preferred habitat types, intersected  
7       with soil series and slope position. Historical and current records of San Joaquin spearscale in the  
8       study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or  
9       swale microtopography along the western border. The vegetation cover of the alkaline soils is  
10       typically a combination of alkaline soil-adapted species and annual grasses, including annual  
11       ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal  
12       wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays  
13       or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level  
14       terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are  
15       present. Because some of the soil series with which San Joaquin spearscale is associated can occur  
16       on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils  
17       occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the  
18       species' habitat requirements, such as modeled habitat polygons falling on leveled or developed  
19       lands, were removed from the model.

20       Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and  
21       playa pools located on alluvium associated with the Montezuma Block along the western boundary  
22       of the study area or on alluvium associated with tertiary formations located along the southwest  
23       boundary of the study area. Stream corridors (intermittent and perennial) that intersected these  
24       geologic units were selected and truncated at the point at which they encountered the upper  
25       elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of  
26       their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the  
27       streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed  
28       from the model.

29       The habitat model for heartscale was based on the species distribution in the study area (Solano and  
30       Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat  
31       was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County  
32       boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and  
33       vernal pool complex natural communities. The model excluded areas that have been developed or  
34       cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

35       Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,  
36       other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,  
37       Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San  
38       Joaquin River). For this species, land cover north of the Discovery Bay area where intensive  
39       agriculture was classified as annual grassland were manually deleted from the area of predicted  
40       habitat. Additionally, other areas of potential habitat that have been developed were also manually  
41       deleted.

42       Full implementation of Alternative 1B would include the following conservation actions over the  
43       term of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3, Section 3.3,  
44       *Effects on Covered Wildlife and Plant Species*).



- 1       ● Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600  
2       acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland  
3       natural community protected under Objective GNC1.1, protect 75 acres of suitable brittlescale  
4       habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11 (Objective  
5       BRIT/HART/SJSC1.1, associated with CM3).
- 6       ● Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones  
7       1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).

8       Alternative 1B would have adverse effects on modeled habitat for San Joaquin spearscale,  
9       brittlescale, heartscale, and Delta button-celery. It would also have adverse effects on occurrences of  
10      heartscale, Heckard's peppergrass, and crownscale. Table 12-1B-63 summarizes the acreage of  
11      modeled alkali seasonal wetland habitat in the study area and the number of occurrences of each  
12      special-status alkali seasonal wetland plant in the study area.

1

**Table 12-1B-63. Summary of Impacts on Alkali Seasonal Wetland Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
San Joaquin spearscale modeled habitat	14,933	748	0	0	Habitat loss from construction of water conveyance facilities, construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration levee construction
Brittlescale modeled habitat	451	4	0	0	Habitat loss from tidal habitat restoration
Heartscale modeled habitat	6,528	306	0	0	Habitat loss from tidal habitat restoration
Delta button celery modeled habitat	3,361 <sup>a</sup>	21	0	0	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	72	0	0	Habitat loss from tidal restoration and Yolo Bypass fisheries enhancements
<b>Covered Species</b>					
San Joaquin spearscale	0	0	19	1	Population loss from tidal habitat restoration
Brittlescale	0	0	6	0	None
Heartscale	0	0	3	0	None
Delta button celery	0	0	1 <sup>b</sup>	0	None
Heckard's peppergrass	0	0	1 <sup>c</sup>	1	Population loss from tidal habitat restoration
<b>Noncovered Species</b>					
Crownscale	0	0	17	1	Population loss from construction of water conveyance facilities
Palmate-bracted bird's-beak	0	0	1	0	None
Recurved larkspur	0	0	4	0	None
<sup>a</sup> A portion of this acreage consists of riparian habitat.					
<sup>b</sup> A second occurrence in study area is in riparian habitat.					
<sup>c</sup> Four additional occurrences of Heckard's peppergrass are associated with vernal pools.					

2

## 1 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

2 Modeled habitat for Delta button-celery would be adversely affected by construction of the  
3 Alternative 1B water conveyance facilities. One population of crownscale also would be adversely  
4 affected by construction of the water conveyance facilities. Modeled habitat for brittlescale and  
5 heartscale could be adversely affected by tidal habitat restoration. One occurrence each of  
6 heartscale and Heckard's peppergrass could be affected by tidal habitat restoration. No adverse  
7 effects on palmate-bracted bird's-beak or recurved larkspur would be expected.

8 The individual effects of each relevant conservation measure are addressed below. A summary  
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
10 conservation measure discussions.

- 11 • *CM1 Water Facilities and Operations:* Under Alternative 1B, construction of the Byron Tract  
12 Forebay would permanently remove 69 acres of modeled habitat for San Joaquin spearscale and  
13 21 acres of modeled habitat for Delta button-celery. This could be an adverse effect, depending  
14 on whether the affected modeled habitat is actually occupied by the species. Modeled habitat is  
15 assumed to encompass all potential habitat for a species and may therefore overestimate the  
16 area actually occupied. Known occurrences of San Joaquin spearscale near the forebay do not  
17 appear to be affected by facilities construction. Delta button-celery is not known to occur in CZ  
18 8; the nearest known occurrence, in CZ 9, would not be affected.

19 Construction of the water conveyance facilities would permanently remove 0.2 acre of habitat  
20 occupied by crownscale at the Byron Tract Forebay. Part of the occurrence would be removed,  
21 but most of the occurrence would not be directly affected. However, a reduction of the  
22 population size, both in area and number of individuals present, would be an adverse impact.

23 Construction of the water conveyance facilities would not affect brittlescale, heartscale,  
24 Heckard's peppergrass, palmate-bracted bird's-beak, or recurved larkspur.

- 25 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries  
26 enhancements would permanently remove 56 acres of modeled habitat for San Joaquin  
27 spearscale. No known occurrences of San Joaquin spearscale would be affected. No modeled  
28 habitat and no known occurrences of the seven other alkali seasonal wetland plants are within  
29 the hypothetical footprint for construction or operation of the Yolo Bypass fisheries  
30 enhancements.

- 31 • *CM3 Natural Communities Protection and Restoration:* The BDCP proposes to benefit alkali  
32 seasonal wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation  
33 Zones 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and  
34 enhanced to sustain populations of native plant species.

- 35 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration is expected to convert  
36 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.  
37 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale  
38 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat  
39 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP  
40 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat  
41 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of  
42 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is  
43 actually occupied by these species is not known; modeled habitat is assumed to encompass all  
44 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal

1 habitat restoration could adversely affect one occurrence of Heckard's peppergrass at Hass  
2 Slough and one occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These  
3 occurrences are based on historic records, and whether the populations still exist is not known.  
4 In each case, the loss of modeled habitat and occurrences for covered species would be adverse  
5 effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved larkspur  
6 would not be affected by tidal habitat restoration.

- 7 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
8 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. No known  
9 occurrences of San Joaquin spearscale would be affected. No other alkali seasonal wetland  
10 habitat or occurrences of special-status alkali seasonal wetland plants are present within areas  
11 proposed for floodplain restoration. Therefore, floodplain restoration and construction of new  
12 floodplain levees would have no impacts on covered and noncovered alkali seasonal wetland  
13 plants.
- 14 • *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-  
15 status alkali seasonal wetland plants are present within areas proposed for channel margin  
16 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts  
17 on covered and noncovered alkali seasonal wetland plants.
- 18 • *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences  
19 of special-status alkali seasonal wetland plants are present within areas proposed for riparian  
20 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on  
21 covered and noncovered alkali seasonal wetland plants.
- 22 • *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat  
23 includes the grassland matrix within which the wetlands occur, grassland restoration activities  
24 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
25 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities  
26 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
- 27 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools  
28 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,  
29 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland  
30 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.  
31 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands from other CMs  
32 by restoring or creating 72 acres of alkali seasonal wetlands in Conservation Zones 1, 8, or 11 to  
33 achieve no net loss of this habitat.
- 34 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
35 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali  
36 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal  
37 wetland plants.
- 38 • *CM22 Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland  
39 plants potentially resulting from implementation of CM1 and CM4 would be avoided or  
40 minimized through *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices*  
41 *and Monitoring*, and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would  
42 be performed during the planning phase of projects, and any impacts on populations of covered  
43 species would be avoided through project design or subsequently minimized through AMM2. In  
44 addition, AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of

1 existing vernal pools, which would protect those species with modeled habitat that includes  
2 vernal pool complex. Occurrences of covered species in vernal pools near tidal wetlands would  
3 not be affected by tidal habitat restoration where critical habitat for vernal pool species is  
4 present and would be avoided under AMM11. AMM37 requires that new recreation trails avoid  
5 populations of covered alkali seasonal wetland plants.

6 In summary, only one known occurrence of a special-status alkali seasonal wetland species  
7 (crownscale) would be affected under Alternative 1B, although one historic occurrence of Heckard's  
8 peppergrass and one historic occurrence of San Joaquin spearscale could also be affected by tidal  
9 restoration activities, if those occurrences still exist. AMM11 would be implemented to avoid an  
10 adverse effect on Heckard's peppergrass and San Joaquin spearscale occurrences.

11 The primary effect of the Alternative 1B on special-status alkali seasonal wetland plants would be  
12 the loss of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and  
13 Delta button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands.  
14 The actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat  
15 less than the estimated impact because some of this habitat is composed of vernal pool complex, and  
16 the BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of  
17 vernal pool complex) over the permit term (AMM12). Loss of modeled habitat would be  
18 compensated for by restoring or creating vernal pool complex, alkali seasonal wetlands, and  
19 grasslands, in proportion to the amount of each habitat removed. At the proposed restoration ratios  
20 of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal  
21 pool complex restoration would be required to compensate for the loss of modeled habitat  
22 composed of vernal pool complex (Objective VPNC1.2, associated with CM9). Approximately 72  
23 acres of alkali seasonal wetlands would be restored (Objective ASWC1.2, associated with CM9). Loss  
24 of modeled habitat composed of grasslands would be compensated for by restoring grassland  
25 habitat on a 1:1 basis (Objective GNC1.1, associated with CM8). These compensation levels would be  
26 consistent with typical NEPA and CEQA project-level mitigation ratios for impacts on vernal pools,  
27 alkali seasonal wetlands, and grasslands.

28 The BDCP would have a small beneficial effect on special-status alkali seasonal wetland plants by  
29 protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific  
30 goal that 75 acres would be modeled habitat for brittlescale and heartscale (Objective  
31 BRIT/HART/SJSC1.1) and another goal that would protect 2 occurrences of San Joaquin spearscale  
32 (Objective BRIT/HART/SJSC1.1). The benefits of habitat protection and management also would  
33 accrue to any noncovered alkali seasonal wetland plants occurring in the protected habitat.

34 **NEPA Effects:** Under Alternative 1B, loss of modeled habitat for alkali seasonal wetland plant  
35 species would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland  
36 habitat (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of  
37 Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,  
38 these effects would not be adverse. The loss of one occurrence of crownscale, a noncovered species,  
39 would result in a reduction in the range and numbers of this species and would be an adverse effect.  
40 Adverse effects on crownscale could be avoided or offset through implementation of Mitigation  
41 Measure BIO-170, *Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant*  
42 *Species*.

43 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would  
44 be offset through restoration, and because impacts on occurrences of covered alkali seasonal

1 wetland plants would be avoided, impacts on alkali seasonal wetlands as a result of implementing  
2 Alternative 1B would not result in substantially reducing the number or restricting the range of five  
3 covered and two noncovered plant species. However, conservation measures that benefit or protect  
4 covered species do not apply to noncovered species, and portions of the crownscale population at  
5 Byron Tract Forebay would be lost, which would be a significant impact. Mitigation Measure BIO-  
6 170 would reduce this impact to a less-than-significant level.

7 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
8 **Special-Status Plant Species**

9 DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize  
10 impacts on species that occur on project sites, and compensate for impacts on species. All  
11 impacts on federally listed noncovered species, diamond-petaled California poppy, or caper-  
12 fruited tropidocarpum shall be avoided. Impacts on other special-status plant species shall be  
13 avoided to the extent feasible, and any unavoidable impacts shall be compensated for.

- 14 • DWR shall conduct surveys for the special-status plant species within and adjacent to all  
15 project sites. Special-status plant surveys required for project-specific permit compliance  
16 will be conducted during the planning phase to allow design of the individual restoration  
17 projects to avoid adverse modification of habitat for specified covered plants. The purpose  
18 of these surveys will be to verify that the locations of special-status plants identified in  
19 previous record searches or surveys are extant, identify any new special-status plant  
20 occurrences, and cover any portions of the project area not previously surveyed. The extent  
21 of mitigation of direct loss of or indirect effects on special-status plants will be based on  
22 these survey results.
- 23 • All surveys shall be conducted by qualified biologists using the using *Guidelines for*  
24 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*  
25 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*  
26 *Impacts to Special Status Native Plant Populations and Natural Communities* (California  
27 Department of Fish and Game 2009) during the season that special-status plant species  
28 would be evident and identifiable, i.e., during their blooming season. Locations of special-  
29 status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 30 • The construction monitoring plan for the protection of covered fish, wildlife, and plant  
31 species, prepared by DWR before implementing an approved project, will provide for  
32 construction activity monitoring in areas identified during the planning stages and  
33 species/habitat surveys as having noncovered special-status plant species.
- 34 • Where surveys determine that a special-status plant species is present in or adjacent to a  
35 project site, direct and indirect impacts of the project on the species shall be avoided  
36 through the establishment of activity exclusion zones, within which no ground-disturbing  
37 activities shall take place, including construction of new facilities, construction staging, or  
38 other temporary work areas. Activity exclusion zones for special-status plant species shall  
39 be established around each occupied habitat site, the boundaries of which shall be clearly  
40 marked with standard orange plastic construction exclusion fencing or its equivalent. The  
41 establishment of activity exclusion zones shall not be required if no construction-related  
42 disturbances will occur within 250 feet of the occupied habitat site. The size of activity  
43 exclusion zones may be reduced through consultation with a qualified biologist and with  
44 concurrence from USFWS or CDFW based on project site-specific conditions.

- 1           • Where avoidance of impacts on a special-status plant species is infeasible, DWR will  
2           compensate for loss of individuals or occupied habitat of a special-status plant species  
3           through the acquisition, protection, and subsequent management in perpetuity of other  
4           existing occurrences at a 2:1 ratio (occurrences affected: occurrences preserved). DWR will  
5           provide detailed information to USFWS and CDFW on the location of the preserved  
6           occurrences, quality of the preserved habitat, feasibility of protecting and managing the  
7           areas in-perpetuity, responsible parties, and other pertinent information. If suitable  
8           occurrences of a special-status plant species are not available for preservation, then the  
9           project shall be redesigned to remove features that would result in impacts on that species.

10           **Grassland Plants**

11           One covered plant and 11 noncovered special-status plants occur in grasslands in the study area  
12           (Tables 12-2, 12-3, summarized in Table 12-1B-64). The only covered plant species occurring in  
13           grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological  
14           features such as stream corridors on alluvium derived from the Montezuma Formation. Stream  
15           corridors (intermittent and perennial) that intersected these geologic units were selected and  
16           truncated at the point at which they encountered the upper elevation of intertidal marsh. The  
17           corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated  
18           maximum extend of alluvium deposits in close proximity to the actual rivers/streams.

19           Full implementation of Alternative 1B would include the following conservation actions over the  
20           term of the BDCP to benefit covered grassland plants (BDCP Chapter 3, Section 3.3, *Effects on*  
21           *Covered Wildlife and Plant Species*).

- 22           • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1  
23           and/or 11 (Objective CGB1.1, associated with CM3).
- 24           • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse  
25           degradation from livestock grazing (Objective CGB1.2, associated with CM11).

26           Of 78,047 acres of grasslands in the study area, Alternative 1B would adversely affect 3,037 acres,  
27           including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of the plants, no known  
28           occurrences would be affected. One of five Parry's rough tarplant occurrences in the study area  
29           could be adversely affected by Alternative 1B. Table 12-1B-64 summarizes the acreage of grassland  
30           habitat in the study area and the number of occurrences of each special-status grassland plant in the  
31           study area.

1 **Table 12-1B-64. Summary of Impacts on Grassland Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Carquinez goldenbush modeled habitat	1,019	4	0	0	Habitat loss from tidal habitat restoration
Grassland	78,047	3,037	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, floodplain restoration, and construction of conservation hatcheries
<b>Covered Species</b>					
Carquinez goldenbush	0	0	10	1	Habitat loss from tidal habitat restoration
<b>Noncovered Species</b>					
Big tarplant	0	0	5	0	None
Round-leaved filaree	0	0	2	0	None
Pappose tarplant	0	0	7	0	None
Parry's rough tarplant	0	0	5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory	0	0	0	0	None
Diamond-petaled poppy	0	0	1	0	None
Stinkbells	0	0	1	0	None
Fragrant fritillary	0	0	4	0	None
Gairdner's yampah	0	0	0	0	None
Streamside daisy <sup>a</sup>	0	0	1	0	None
Caper-fruited tropidocarpum	0	0	8	0	None
<sup>a</sup> This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.					

2

3 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species**

4 Alternative 1B, could have adverse effects on modeled habitat for Carquinez goldenbush. It could  
 5 also have adverse effects on one occurrence of Carquinez goldenbush and one occurrence of Parry's  
 6 rough tarplant. Although Alternative 1B would have no expected effects on known occurrences of  
 7 the other special-status plant species that occur in grasslands, the loss of 3,037 acres of grassland  
 8 would have the potential to adversely affected undocumented populations of special-status  
 9 grassland species.



1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 ● *CM1 Water Facilities and Operations*: No modeled habitat for Carquinez goldenbush and no  
5 known occurrences of the 12 special-status grassland plants are within the proposed footprint  
6 for the Alternative 1B water conveyance facilities. About 758 acres of grassland habitat would  
7 be affected by construction of the water conveyance facilities. However, this grassland habitat  
8 primarily consists of small patches of herbaceous ruderal vegetation along levees that do not  
9 provide habitat for special-status grassland species. Therefore, under Alternative 1B,  
10 construction and operation of the water conveyance facilities would not affect the 12 special-  
11 status grassland plants.
- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
13 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would  
14 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Causeway  
15 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is  
16 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet  
17 season, such as swales and seasonal wetlands. Increasing the frequency or duration of  
18 inundation may decrease the distribution in some areas by making some conditions too wet but  
19 would also expand the distribution into areas that may currently be too dry. Overall, changing  
20 the frequency and duration of inundation in the area of this occurrence should not result in a  
21 substantial change in the range of numbers of Parry's rough tarplant. Construction and  
22 operation of the Yolo Bypass fisheries enhancements would not affect modeled habitat for  
23 Carquinez goldenbush or known occurrences of other special-status grassland plants.
- 24 ● *CM3 Natural Communities Protection and Restoration*: Alternative 1B would preserve 8,000  
25 acres of grassland habitat, some of which may contain modeled habitat for Carquinez  
26 goldenbush. Protection of grassland habitat may also protect undiscovered occurrences of  
27 special-status plant species.
- 28 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently  
29 remove 1,122 acres of grassland habitat. Four acres of modeled habitat for Carquinez  
30 goldenbush along the eastern side of Suisun Marsh could be adversely affected, including part of  
31 one known occurrence. No other known occurrences of special-status grassland plants are  
32 within the hypothetical footprint of tidal restoration.
- 33 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would  
34 result in the loss of 85 acres of grassland habitat, periodic inundation of the floodplain would  
35 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be  
36 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known  
37 occurrences of special-status grassland plants are present within areas proposed for floodplain  
38 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that  
39 does not support special-status grassland plants. Therefore, floodplain restoration and  
40 construction of new floodplain levees would have no impacts on covered and noncovered  
41 grassland plants.
- 42 ● *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are  
43 present within areas proposed for channel margin habitat enhancement. Areas mapped as  
44 grassland along levees that would be affected by channel margin habitat enhancement are small  
45 patches of ruderal vegetation along levees that do not provide habitat for special-status

1 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel  
2 margin habitat enhancement would have no impacts on covered and noncovered grassland  
3 plants.

- 4 ● *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or  
5 known occurrences of special-status grassland plants are present within areas proposed for  
6 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts  
7 on covered and noncovered grassland plants.
- 8 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres  
9 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,  
10 cultivated land) or degraded grasslands. These areas do not currently provide habitat for  
11 special-status grassland plants. Therefore, grassland communities restoration would have no  
12 impacts on covered and noncovered grassland plants.
- 13 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes  
14 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored  
15 would consist of areas of former vernal pool complex that have been leveled for cultivation,  
16 special-status grassland plants would not be present. Therefore, vernal pool and Alkali Seasonal  
17 Wetland complex restoration would not affect special-status grassland plants.
- 18 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
19 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland  
20 habitat and would have no impacts on covered and noncovered grassland plants.
- 21 ● *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35  
22 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation  
23 that would not be likely to provide habitat for special-status grassland plants. Therefore,  
24 construction of the conservation hatcheries would not be expected to affect special-status  
25 grassland plants.
- 26 ● *CM22 Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially  
27 resulting from implementation of CM4 and potential effects on undiscovered populations of  
28 special-status grassland plants would be avoided or minimized through *AMM11 Covered Plant*  
29 *Species*, *AMM2 Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*.  
30 Under AMM11, surveys for covered plant species would be performed during the planning  
31 phase of projects, and any impacts on populations of covered species would be avoided through  
32 project design or subsequently minimized through AMM2. AMM37 requires that new recreation  
33 trails would avoid populations of Carquinez goldenbush.

34 The primary effect of Alternative 1B on special-status grassland plants is the loss of potential (i.e.,  
35 modeled) habitat for Carquinez goldenbush, including part of one known occurrence. Under  
36 AMM11, the occurrence would be surveyed to establish the population limits and to redesign the  
37 project to avoid affecting the populations, to the extent feasible. Protecting three unprotected  
38 occurrences of Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and  
39 enhancing occupied Carquinez goldenbush (Objective CGB1.2, associated with CM11) would  
40 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by  
41 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status  
42 grassland plants would be affected.

43 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting  
44 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit

1 Carquinez goldenbush, the plan proposes to protect at least three Carquinez goldenbush  
2 occurrences in CZ 1 and CZ 11 that are currently not protected and to maintain and enhance  
3 occupied Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together  
4 with avoidance and minimization of impacts on species occurrences, would reduce any effects of  
5 BDCP implementation on covered grassland plants to a level that is no longer adverse.

6 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset  
7 through CM3, CM8, and CM11. Therefore, implementation of Alternative 1B would result in no  
8 adverse effects on special-status grassland plants.

9 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be  
10 avoided or compensated for, Alternative 1B would not result in a reduction in the range and  
11 numbers of covered and noncovered grassland plants, and this impact would be less than significant.  
12 No mitigation is required.

### 13 **Valley/Foothill Riparian Plants**

14 Two covered plants and two noncovered special-status plants occur in valley/foothill riparian  
15 habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-1B-65). The valley/foothill  
16 riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area  
17 along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to  
18 Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough  
19 thistle is unknown; all known occurrences of these species within the area of modeled habitat are  
20 believed to be extirpated.

21 Full implementation of Alternative 1B would include the following conservation actions over the  
22 term of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3, Section 3.3,  
23 *Effects on Covered Wildlife and Plant Species*).

- 24 ● Protect and enhance two occurrences of delta button celery. If occurrences are not found in the  
25 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two  
26 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in  
27 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3  
28 and CM11).
- 29 ● Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan  
30 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within  
31 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in  
32 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and  
33 CM11).

34 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 1B would adversely  
35 affect 896 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres  
36 that are modeled habitat for slough thistle. Table 12-1B-65 summarizes the acreage of modeled  
37 habitat for Delta button-celery and slough thistle and the number of occurrences of each special-  
38 status grassland plant in the study area.

1 **Table 12-1B-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta button celery modeled habitat	3,361 <sup>a</sup>	15	0	0	Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11	0	0	Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	896	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta button celery	0	0	1 <sup>b</sup>	1	Occurrence potentially affected by floodplain restoration
Slough thistle	0	0	2	2	Occurrences potentially affected by floodplain restoration
<b>Noncovered Species</b>					
Northern California black walnut	0	0	1	0	None
Wright's trichocoronis	0	0	1	0	None

<sup>a</sup> A portion of this acreage consists of alkali seasonal wetland.  
<sup>b</sup> A second occurrence is in alkali seasonal wetland.

2

3 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

4 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or  
5 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status  
6 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough  
7 thistle, which may support undocumented occurrences of these species, would be affected by  
8 restoration of seasonally inundated floodplain.

9 The individual effects of each relevant conservation measure are addressed below. A summary  
10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
11 conservation measure discussions.

- 12 • *CM1 Water Facilities and Operations*: Construction of the water conveyance facilities would  
13 remove 91 acres of valley-foothill riparian habitat under Alternative 1B. However, no modeled  
14 habitat and no known occurrences of the four special-status valley/foothill riparian plants are  
15 within the proposed footprint for the Alternative 1B water conveyance facilities. Therefore,  
16 under Alternative 1B, construction and operation of the water conveyance facilities would not  
17 affect covered or noncovered special-status valley/foothill riparian plants.

- 1       ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries  
2       enhancements would adversely affect 378 acres of valley/foothill riparian habitat. However, no  
3       modeled habitat and no known occurrences of the four special-status valley/foothill riparian  
4       plants are within the hypothetical footprint for construction or operation of the Yolo Bypass  
5       fisheries enhancements. Therefore, construction and operation of the Yolo Bypass fisheries  
6       enhancements would not affect the covered or noncovered valley/foothill riparian plants.
- 7       ● *CM3 Natural Communities Protection and Restoration*: Alternative 1B would protect 552 acres of  
8       existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on  
9       special-status valley/foothill plants because no extant occurrences of special-status  
10      valley/foothill plants are present in the study area.
- 11      ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres  
12      of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of  
13      the four special-status valley/foothill riparian plants are within the hypothetical footprint for  
14      tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered  
15      valley/foothill riparian plants.
- 16      ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
17      would remove 15 acres of modeled habitat for Delta button-celery along the San Joaquin River  
18      in CZ 7. In addition, floodplain restoration would result in more frequent and longer inundation  
19      of 18 acres of modeled habitat for Delta button-celery in this area. The area affected contains  
20      one historic occurrence of Delta button celery. This occurrence is considered to be extirpated,  
21      because all habitat for Delta button-celery at his location has been converted to agriculture  
22      (California Department of Fish and Wildlife 2013). Therefore, Alternative 1B would not have an  
23      adverse effect on Delta button celery in CZ 7.

24      The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of  
25      valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.  
26      Although Delta button celery occurs in riparian habitat, it is not associated with woodland or  
27      scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not  
28      also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not  
29      be compatible with restoring woody riparian habitat. In addition, establishing new populations  
30      of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any  
31      beneficial effects on Delta button-celery would be speculative.

32      Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough  
33      thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat  
34      for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50  
35      acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled  
36      habitat is actually occupied by slough thistle is not known; however, of two historic occurrences  
37      of slough thistle present in the study area, only one is considered to be extirpated (California  
38      Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences  
39      of slough thistle. If occurrences are not found in the study area, then two self-sustaining  
40      occurrences of slough thistle would be established using locally-sourced genetic material for a  
41      total of two occurrences within the restored floodplain habitat on the main stem of the San  
42      Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new  
43      populations of slough thistle is an untried, unproven procedure and may not be feasible.  
44      Therefore, any beneficial effects on slough thistle would be speculative.

1 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could  
2 also be affected by floodplain restoration. The occurrence is presumed to be extant because the  
3 presence or absence of suitable habitat has not been verified by field surveys (California  
4 Department of Fish and Wildlife 2013). However, the species has not been observed at this  
5 location for nearly a century, and habitat for Wright's trichocoronis, which would have been  
6 similar to that for Delta button celery and slough thistle, no longer appears to be present in  
7 aerial photographs of the area. Therefore, Alternative 1B would not be expected to have an  
8 adverse effect on Wright's trichocoronis.

- 9 ● *CM6 Channel Margin Enhancement*: No modeled habitat or occurrences of special-status  
10 valley/foothill riparian plants are present within areas proposed for channel margin habitat  
11 enhancement. Therefore, channel margin habitat enhancement would have no impacts on  
12 covered and noncovered valley/foothill riparian plants.
- 13 ● *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status  
14 valley/foothill riparian plants are present within areas proposed for riparian habitat  
15 restoration. Therefore, riparian habitat restoration would have no impacts on covered and  
16 noncovered valley/foothill riparian plants.
- 17 ● *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill  
18 riparian plants are present within areas proposed for grassland communities restoration.  
19 Therefore, grassland communities restoration would have no impacts on covered and  
20 noncovered valley/foothill riparian plants.
- 21 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-  
22 status valley/foothill riparian plants are present within areas proposed for vernal pool and  
23 alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal wetland  
24 complex restoration would have no impacts on covered and noncovered valley/foothill riparian  
25 plants.
- 26 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
27 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid  
28 valley/foothill riparian habitat and would have no impacts on covered and noncovered  
29 valley/foothill riparian plants.
- 30 ● *CM22 Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle  
31 potentially resulting from implementation of CM5 would be avoided or minimized though  
32 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*  
33 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the  
34 planning phase of projects, and any impacts on populations of covered species would be avoided  
35 through project design or subsequently minimized through AMM2.

36 Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in  
37 the study area, Alternative 1B is not expected to adversely affect any special-status valley/foothill  
38 riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected.  
39 Under AMM11, surveys for covered plants would be performed during the planning phase for  
40 floodplain restoration. If Delta button-celery or slough thistle were found to be present in the  
41 floodplain restoration area, then the project would be designed to avoid impacts on the populations.  
42 Therefore, Alternative 1B would not have an adverse effect on these species.

43 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of  
44 valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing

1 new populations of Delta-button-celery or slough thistle would be a beneficial effect. However,  
2 establishing new populations is an untried, unproven procedure and may not be feasible.

3 **NEPA Effects:** Implementing the BDCP under Alternative 1B would not have an adverse effect on  
4 special-status valley/foothill riparian plant species.

5 **CEQA Conclusion:** Alternative 1B would not result in a reduction in the range and numbers of  
6 covered and noncovered valley/foothill riparian plants, and this impact would be less than  
7 significant. No mitigation is required.

## 8 **Tidal Wetland Plants**

9 Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study  
10 area (Tables 12-2, 12-3, summarized in Table 12-1B-66). Five tidal wetland habitat models were  
11 developed for the seven covered plant species occurring in tidal wetland habitat.

12 Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3  
13 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which  
14 was obtained from the BDCP GIS vegetation data layer.

15 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area  
16 according to the species' habitat association with woody riparian habitat. The model selected Delta  
17 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to  
18 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits  
19 of the BDCP Valley Riparian natural community characterized by California dogwood, white alder,  
20 and arroyo willow.

21 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated  
22 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was  
23 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal  
24 perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons  
25 that were limited by specific vegetation units that are known to be closely associated with soft  
26 bird's-beak habitat.

27 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of  
28 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was  
29 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,  
30 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill  
31 riparian, or cultivated land habitats cover types. For brackish water areas in and near Suisun Marsh,  
32 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10  
33 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60  
34 centimeters) above intertidal.

35 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish  
36 emergent wetland polygons with the appropriate vegetation. This included vegetation units  
37 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

38 Full implementation of Alternative 1B would include the following conservation actions over the  
39 term of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3, Section 3.3, *Effects on*  
40 *Covered Wildlife and Plant Species*).

- 1 • No net loss of Mason’s lilaepsis and delta mudwort occurrences within restoration sites, or  
2 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated  
3 with CM4 and CM11).
- 4 • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites  
5 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 6 • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded  
7 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 8 • Complete seed banking of all existing Suisun Marsh populations and the representative genetic  
9 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 10 • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection  
11 protocols (Objective SBB/SuT1.3, associated with CM11).
- 12 • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,  
13 associated with CM11).

14 Of 17,357 acres of tidal wetlands in the study area, Alternative 1B would affect 28 acres, including  
15 areas that are modeled habitat for Mason’s lilaepsis, Delta mudwort, side-flowering skullcap, Delta  
16 tule pea, Suisun Marsh aster, soft bird’s-beak, and Suisun thistle. Known occurrences of all of these  
17 species would be affected. In addition, four occurrences of Bolander’s water-hemlock, a noncovered  
18 special-status plant, could be affected by tidal habitat restoration. Table 12-1B-66 summarizes the  
19 acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each  
20 special-status tidal wetland plants in the study area.

21 **Table 12-1B-66. Summary of Impacts on Tidal Wetland Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta mudwort/Mason’s lilaepsis modeled habitat	6,081	53	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,447	13	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Soft bird’s-beak modeled habitat	1,228	73	0	0	Habitat loss from tidal habitat restoration
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	5	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73	0	0	Habitat loss from tidal habitat restoration



	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Tidal brackish emergent wetland	8,501	0	0	0	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	28	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta mudwort	0	0	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	0	0	106	28	Occurrences affected by tidal habitat restoration
Mason's lilaepsis	0	0	181	18	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	0	0	12	2	Occurrences affected by construction of water conveyance facilities
Soft bird's-beak	0	0	13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster	0	0	164	27	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle	0	0	4	0	None
<b>Noncovered Species</b>					
Bolander's water hemlock	0	0	8	3	Occurrences affected by tidal habitat restoration

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**Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

3

Alternative 1B would have adverse effects on tidal marsh special-status plants through implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation of CM3, CM6, CM7, CM8, and CM9.

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The individual effects of each relevant conservation measure are addressed below. A summary statement of the combined impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

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- *CM1 Water Facilities and Operations*: Construction of the Alternative 1B water conveyance facilities would remove 39 acres of modeled habitat for delta mudwort and Mason's lilaepsis, 7 acres of modeled habitat for side-flowering skullcap, and 4 acres of modeled habitat for Delta tule pea and Suisun Marsh aster. The extent to which modeled habitat is actually occupied by these species is not known; however, three occurrences of Mason's lilaepsis, two occurrences

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1 of Delta tule pea, and two occurrences of side-flowering skullcap in the study area could be  
2 affected by construction impacts. No known occurrences of the other covered and noncovered  
3 tidal wetland species would be affected by construction of the water conveyance facilities.

- 4 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
5 enhancements would remove 5 acres of modeled habitat for Mason's lilaepsis and delta  
6 mudwort. The extent to which modeled habitat is actually occupied by these species is not  
7 known; however, no known occurrences in the study area would be affected. Yolo Bypass  
8 operations would result in more frequent and longer inundation of 8 acres of modeled habitat  
9 Delta tule peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster would be  
10 affected by Yolo Bypass operations. Habitat for these species is normally periodically inundated  
11 or saturated; therefore, a small increase in the frequency and duration of periodic inundation of  
12 the habitat would not be expected to have a substantial effect.
- 13 ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes restoring or creating  
14 20 linear miles of transitional tidal areas within other natural communities that would be  
15 created or restored, including 6,000 acres of tidal brackish emergent wetland and 24,000 acres  
16 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these  
17 areas would be maintained and enhanced. The BDCP does not specifically propose to protect  
18 any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat  
19 or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal  
20 areas will be passively colonized by the covered tidal wetland plants.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently  
22 remove 6 acres of modeled habitat for Mason's lilaepsis and Delta mudwort. Habitat loss would  
23 occur through conversion of the species habitat (at and immediately above the tidal zone in  
24 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled  
25 habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences  
26 of Mason's lilaepsis and 3 of 58 known occurrences of delta mudwort in the study area could be  
27 affected by tidal habitat restoration.

28 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.  
29 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not  
30 known; however, none of the 12 known occurrences in the study area would be affected.

31 Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tule pea and Suisun  
32 Marsh aster. However, the BDCP would allow up to 50 acres of modeled habitat to be removed.  
33 Habitat loss would result from conversion of the species habitat (at and immediately above the  
34 tidal zone in marshes and along rivers and streams) to inundated tidal habitat. The extent to  
35 which modeled habitat is actually occupied by the species is not known; however, 26 of 106  
36 known occurrences of Delta tule pea and 24 of 164 occurrences of Suisun Marsh aster in the  
37 study area would be affected.

38 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun  
39 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually  
40 occupied by the species is not known; however, seven of 13 known occurrences of soft bird's-  
41 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in  
42 the study area would be affected.

43 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-  
44 hemlock, a noncovered special-status species in the study area. Because Bolander's water-

1 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site  
2 preparation, earthwork, and other site activities could adversely affect Bolander's water-  
3 hemlock through direct habitat removal.

- 4 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
5 would remove 3 acres of modeled habitat for Mason's lilaeopsis and delta mudwort and 2 acres  
6 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the  
7 study area would be affected by floodplain restoration.

8 Floodplain restoration would result in more frequent and longer inundation of 2 acres of  
9 modeled habitat for Mason's lilaeopsis and delta mudwort, 18 acres of modeled habitat for side-  
10 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No  
11 known occurrences of these species in the study area would be affected by periodic inundation  
12 of restored floodplain habitat. Habitat for these species is normally periodically inundated or  
13 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the  
14 habitat would not be expected to have a substantial effect.

- 15 ● *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed  
16 separately from the effects of tidal habitat restoration. Channel margin enhancement would  
17 have adverse effects on tidal wetland plants through direct removal and habitat modification.  
18 However, it would have beneficial effects on these species by improving the habitat functions for  
19 these species as a result of riprap removal and creation of floodplain benches. Side-flowering  
20 skullcap would benefit from installation of large woody material, which it appears to colonize.

- 21 ● *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to  
22 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat  
23 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out  
24 for CM7 would be placed in floodplain areas, not in tidal wetlands.

- 25 ● *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-  
26 status tidal wetland plants are present within areas proposed for grassland communities  
27 restoration. Therefore, grassland communities restoration would have no impacts on covered  
28 and noncovered tidal wetland plants.

- 29 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or  
30 occurrences of special-status tidal wetland plants are present within areas proposed for vernal  
31 pool and alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal  
32 wetland complex restoration would have no impacts on covered and noncovered tidal wetland  
33 plants.

- 34 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
35 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland  
36 habitat and would have no impacts on covered and noncovered tidal wetland plants.

- 37 ● *CM22 Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially  
38 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized  
39 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*  
40 *Monitoring*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*.  
41 Under AMM11, surveys for covered plant species would be performed during the planning  
42 phase of projects, and any impacts on populations of covered species would be avoided through  
43 project design or subsequently minimized through AMM2. In addition, AMM11 contains specific  
44 guidance to avoid adverse modification of any of the primary constituent elements for Suisun

1 thistle or soft bird's-beak critical habitat. AMM30, which specifies that proposed transmission  
2 line poles and towers would be sited to avoid sensitive terrestrial and aquatic habitats, to the  
3 maximum extent feasible, would avoid some impacts on Mason's lilaepsis, Delta tule pea, and  
4 side-flowering skullcap. AMM37 requires that new recreation trails avoid populations of  
5 covered tidal wetland plants.

6 In summary, the GIS analysis indicates that Alternative 1B would result in the loss of modeled  
7 habitat for all of the covered species and result in adverse effects on known occurrences of most of  
8 the special-status plants occurring in tidal wetlands. However, the BDCP predicts that habitat  
9 restoration activities would greatly expand the amount of habitat available to each of these species,  
10 offsetting any potential loss of habitat or occurrences resulting from covered activities.

11 Delta mudwort could lose 53 acres of modeled habitat (0.9%), including all or part of three  
12 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
13 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
14 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement  
15 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
16 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also  
17 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
18 predicts that natural expansion of populations into the restored habitat would take place and result  
19 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
20 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
21 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

22 Mason's lilaepsis could lose 53 acres of modeled habitat (0.9%), including all or part of 18  
23 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
24 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
25 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement  
26 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
27 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also  
28 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
29 predicts that natural expansion of populations into the restored habitat would take place and result  
30 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
31 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
32 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

33 Delta tule pea could lose 5 acres of modeled habitat (0.08%), including all or part of 28 occurrences.  
34 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
35 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
36 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian  
37 natural community restoration (CM7) would also consider the potential for creating habitat for  
38 Delta tule pea; creation of suitable habitat under these measures could also help offset this habitat  
39 loss. Although active restoration of this species is not proposed, the BDCP predicts that natural  
40 expansion of populations into the restored habitat would take place and result in no net loss of  
41 occurrences (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of  
42 affected occurrences and occurrences in reserve lands would be done to confirm that no net loss of  
43 occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

1 Suisun Marsh aster could lose 5 acres of modeled habitat (0.08%), including all or part of 27  
2 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
3 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
4 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin  
5 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the  
6 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these  
7 measures could also help offset this habitat loss. Although active restoration of this species is not  
8 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would  
9 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-  
10 implementation monitoring of affected occurrences and occurrences in reserve lands would be done  
11 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,  
12 associated with CM11).

13 All four of these species (Delta mudwort, Mason's lilaopsis, Delta tule pea, and Suisun Marsh aster)  
14 are widespread in the study area with many occurrences. Habitat modification and loss are the  
15 primary stressors that are responsible for their decline and that currently limit their distribution  
16 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these  
17 species would provide a reasonable expectation that the distribution and abundance of these  
18 species would also improve. Because a relatively small amount of modeled habitat would be  
19 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered  
20 activities on these species would be offset and that the overall effect of Alternative 1B on these  
21 species would not be adverse.

22 Side-flowering skullcap could lose 13 acres of modeled habitat (0.5%), including all or part of two  
23 occurrences. One occurrence would be avoided through implementation of AMM30. The location of  
24 a second potentially affected occurrence, which was last observed in 1892, is not known precisely.  
25 Under AMM11, this occurrence would be surveyed for, and because this is a tidal freshwater  
26 wetland species, avoidance of the habitat during project construction would be highly likely. The  
27 BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives TBEWNC1.1  
28 and TFEWNC1.1) would increase the extent of habitat available for colonization by side-flowering  
29 skullcap, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian  
30 natural community restoration (CM7) will also consider the potential for creating habitat for side-  
31 flowering skullcap; creation of suitable habitat under these measures could also help offset this  
32 habitat loss. No active restoration of this species is proposed, and no post-implementation  
33 monitoring of affected occurrences and occurrences in reserve lands would be done. Because  
34 impacts on occurrences of side-flowering skullcap would be avoided, and because loss of modeled  
35 habitat for the species would be offset through restoration, the overall effect of Alternative 1B on  
36 this species would not be adverse.

37 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven  
38 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
39 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
40 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill  
41 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak  
42 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
43 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.  
44 Although no active restoration of this species is proposed, post-implementation monitoring of soft  
45 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that  
46 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft

1 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and  
2 habitat modification is the primary factor responsible for the species' decline and limiting the  
3 species' distribution and abundance. Improving habitat functions for this species would provide a  
4 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.  
5 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft  
6 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.  
7 Therefore, it is likely that the overall effect of Alternative 1B on this species would not be adverse.

8 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be  
9 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
10 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
11 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological  
12 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle  
13 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
14 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In  
15 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective  
16 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences  
17 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or  
18 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement  
19 of habitat functions, and establishment of new occurrences would offset any potential loss of  
20 modeled habitat for Suisun Marsh thistle.

21 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential  
22 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun  
23 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives  
24 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by  
25 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered  
26 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable  
27 expectation that habitat restoration without active species-specific restoration activities would  
28 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-  
29 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to  
30 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative  
31 1B on Bolander's water hemlock could be adverse.

32 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants  
33 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative  
34 1B would result in no adverse effects on seven of eight special-status grassland plants in the study  
35 area. Alternative 1B would result in a reduction in the range and numbers of Bolander's water-  
36 hemlock, which would be an adverse effect. Adverse effects on Bolander's water-hemlock could be  
37 avoided or offset through implementation of Mitigation Measure BIO-170, *Avoid, Minimize, or*  
38 *Compensate for Impacts on Noncovered Special-Status Plant Species.*

39 **CEQA Conclusion:** Because loss of occurrences and modeled habitat for covered tidal habitat plant  
40 species would be offset through habitat restoration, impacts on covered tidal wetland plants as a  
41 result of implementing Alternative 1B would not be significant. However, the loss of Bolander's  
42 water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this  
43 species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would  
44 reduce this impact to a less-than-significant level.

1           **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
2           **Special-Status Plant Species**

3           Please see Mitigation Measure BIO-170 under Impact BIO-170.

4           **Inland Dune Plants**

5           **Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants**

6           Alternative 1B would have no adverse effects on inland dune plants (Table 12-1B-67). No  
7           construction activities or habitat restoration would take place where the species occur. No specific  
8           actions to benefit inland dune species are proposed.

9           **Table 12-1B-67. Summary of Impacts on Inland Dune Plants under Alternative 1B**

	Acres in Study Area	Acres affected	Occurrence in Study Area	Occurrences Affected	Impacts
<b>Modeled Habitat</b>					
Inland Dunes	19	0	0	0	None
<b>Noncovered Species</b>					
Hoover’s cryptantha	0	0	1	0	None
Antioch Dunes buckwheat	0	0	1	0	None
Mt. Diablo buckwheat	0	0	1	0	None
Contra Costa wallflower	0	0	3	0	None
Antioch Dunes evening- primrose	0	0	9	0	None

10  
11           **NEPA Effects:** Implementing the BDCP under Alternative 1B would not affect special-status inland  
12           dune plant species.

13           **CEQA Conclusion:** Implementation of Alternative 1B would have no impacts on inland dune species.  
14           No mitigation is required.

15           **Nontidal Wetland Plants**

16           No covered plant species occur in nontidal wetlands in the study area; however, six noncovered  
17           special-status plant species occur in nontidal wetlands in the study area. Table 12-1B-68  
18           summarizes the acreage of nontidal wetland habitat in the study area and the number of  
19           occurrences of each special-status nontidal wetland plant in the study area.

1 **Table 12-1B-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Nontidal freshwater aquatic	5,567	293	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	137	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Noncovered Species</b>					
Watershield	0	0	3	0	None
Bristly sedge	0	0	18	4	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow <sup>a</sup>	0	0	121	15	Loss of habitat from construction of water conveyance facilities and from tidal habitat restoration
Eel grass pondweed	0	0	1	0	None
Sanford's arrowhead	0	0	23	3	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Marsh skullcap <sup>a</sup>	0	0	3	0	None

<sup>a</sup> Also occurs in valley/foothill riparian habitat.

2

3 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

4 Under Alternative 1B, known occurrences of bristly sedge and woolly rose-mallow are within the  
5 proposed footprint for the water conveyance facilities or within the hypothetical footprint for  
6 restoration activities and would be adversely affected. Alternative 1B would have no adverse effects  
7 on watershield, eel-grass pondweed or marsh skullcap.

8 The individual effects of each relevant conservation measure are addressed below. A summary  
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
10 conservation measure discussions.



- 1       ● *CM1 Water Facilities and Operations*: Construction of the Alternative 1B water conveyance  
2 facilities would adversely affect three noncovered special-status plants occurring in nontidal  
3 wetlands. Two occurrences of bristly sedge in CZ 4 and CZ 5, including approximately 1.54 acres  
4 of occupied habitat, would be affected by construction of the water conveyance facilities. Eleven  
5 occurrences of woolly rose-mallow would be affected. Five occurrence would be affected by  
6 construction of the intake structures, and six occurrences would be affected by siphon works  
7 areas and borrow/spoils sites. Two occurrences of Sanford's arrowhead would be affected.
- 8       ● *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal  
9 wetland plants are present in the hypothetical footprint for construction or operation of the  
10 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass  
11 Fisheries enhancements would not affect special-status nontidal marsh plants.
- 12       ● *CM3 Natural Communities Protection and Restoration*: No specific natural communities  
13 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of  
14 special-status nontidal plants are proposed for protection.
- 15       ● *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead in  
16 CZ 2 and one occurrence of woolly rose-mallow in CZ 7 are present within areas proposed for  
17 tidal habitat restoration and could be lost as a result of habitat conversion. Therefore, tidal  
18 habitat restoration would have an adverse effect on these species. No other special-status tidal  
19 wetland plants would be affected.
- 20       ● *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status  
21 nontidal wetland plants are present within areas proposed for floodplain restoration. Therefore,  
22 floodplain restoration and construction of new floodplain levees would have no impacts on  
23 special-status nontidal wetland plants.
- 24       ● *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland  
25 plants are present within areas proposed for channel margin habitat enhancement. Therefore,  
26 channel margin habitat enhancement would have no impacts on special-status nontidal wetland  
27 plants.
- 28       ● *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal  
29 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,  
30 riparian habitat restoration would have no impacts on special-status nontidal wetland plants.
- 31       ● *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal  
32 wetland plants are present within areas proposed for grassland communities restoration.  
33 Therefore, grassland communities restoration would have no impacts on special-status nontidal  
34 wetland plants.
- 35       ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of  
36 special-status nontidal wetland plants are present within areas proposed for vernal pool and  
37 alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal wetland  
38 complex restoration would have no impacts on special-status nontidal wetland plants.
- 39       ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
40 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing  
41 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.  
42 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater  
43 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial

1 emergent wetland communities, and by maintaining and enhancing the habitat functions of  
2 protected and created nontidal wetland habitats for covered and other native species. However,  
3 no specific actions to benefit noncovered species are proposed.

4 Under Alternative 1B, 1,500 acres of nontidal marsh would be restored (Objective  
5 NFEW/NPANC1.1, addressed under CM10). However, these wetlands would be restored primarily  
6 as habitat for giant garter snake. These habitat restoration activities would be unlikely to expand the  
7 amount of habitat available to bristly sedge, woolly rose-mallow, and Sanford's arrowhead, potential  
8 loss of habitat or occurrences resulting from covered activities would not be compensated for.  
9 Moreover, because special-status nontidal wetland plant species are not covered under the BDCP,  
10 the species protections afforded to covered species under CM22 do not apply to these species, and  
11 the effects of Alternative 1B on these species would be adverse.

12 **NEPA Effects:** Implementation of the BDCP under Alternative 1B could result in a reduction in the  
13 range and numbers of bristly sedge, woolly rose-mallow, and Sanford's arrowhead, three  
14 noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on these  
15 species could be avoided or offset through implementation of Mitigation Measure BIO-170.

16 **CEQA Conclusion:** Under Alternative 1B, construction of the water conveyance facilities and tidal  
17 habitat restoration could result in a reduction in the range and numbers of bristly sedge, woolly  
18 rose-mallow, and Sanford's arrowhead. Tidal habitat restoration could result in a reduction in the  
19 range and numbers of Sanford's arrowhead and woolly rose-mallow. These impacts would be  
20 significant. Implementation of Mitigation Measure BIO-170 would reduce these impacts to a less-  
21 than-significant level.

22 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
23 **Special-Status Plant Species**

24 Please see Mitigation Measure BIO-170 under Impact BIO-170.

25 **General Terrestrial Biology Effects**

26 **Wetlands and Other Waters of the United States**

27 Alternative 1B actions would both permanently and temporarily remove or convert wetlands and  
28 open water that is potentially jurisdictional as regulated by the USACE under Section 404 of the  
29 CWA. The following two impacts address the project-level effects of CM1 on these potential  
30 wetlands and waters, and the programmatic-level effects of other relevant conservation actions  
31 (CM2–CM10). CM11–CM22 would not directly result in loss or conversion of wetlands or other  
32 waters of the United States. The methods used to conduct these analyses are described in Section  
33 12.3.2.4 of this chapter.

34 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**  
35 **Other Waters of the United States**

36 Construction of the Alternative 1B water conveyance facilities would both temporarily and  
37 permanently remove potential wetlands and other waters of the United States as regulated by  
38 Section 404 of the CWA (Table 12-1B-69). Based on the methodology used to conduct this analysis,  
39 the losses would occur at pipeline, canal and intake areas, borrow/spoil storage sites, transmission  
40 corridors, forebay site, and multiple temporary work areas associated with the construction activity.

1 The permanent open water and wetland losses (346 acres) would occur at scattered locations along  
 2 the water conveyance facility alignment, with the majority caused by construction of Alternative  
 3 1B's five intake structures along the eastern bank of the Sacramento River between Freeport and  
 4 Courtland in the north Delta (including associated spoil/borrow areas), along the entire canal route  
 5 in the east Delta, and at the Byron forebay site in the south Delta. The temporary open water and  
 6 wetland effects (206 acres) would also occur mainly at the five intake construction sites along the  
 7 eastern bank of the Sacramento River, and at temporary siphon work areas where the canal crosses  
 8 under eastern Delta sloughs and waterways.

9 **Table 12-1B-69. Loss of Potential Wetlands and Other Waters of the United States from**  
 10 **Construction of Alternative 1B Water Conveyance Facilities**

Wetland/Other Water Type <sup>a</sup>	Permanent	Temporary	Total
<b>Open Water</b>			
Nontidal Flow	239	27	266
Muted Tidal Flow	6	0	6
Tidal Flow	20	141	161
Pond or Lake (nontidal)	33	2	35
Clifton Court Forebay	1	0	1
<b>Wetland</b>			
Nontidal Wetland	42	11	53
Tidal Wetland	5	25	30
Seasonal Wetland	<1	0	<1
<b>Total Impact Acres</b>	<b>346</b>	<b>206</b>	<b>552</b>

<sup>a</sup> Wetland types are described in the methods section of this chapter (Section 12.3.2.4).  
 Source: California Department of Water Resources 2013.

11  
 12 **NEPA Effects:** The permanent and temporary loss of these potential jurisdictional wetlands as a  
 13 result of constructing Alternative 1B water conveyance facilities would be a substantial effect if not  
 14 compensated by wetland protection and/or restoration. This loss would represent a removal of  
 15 federally protected wetlands as defined by Section 404 of the CWA. However, Alternative 1B  
 16 includes conservation measures (CM4 and CM10) that would restore and protect large acreages of  
 17 both tidal and nontidal wetlands and open water in the study area.

18 Through the course of the BDCP restoration program, Alternative 1B would restore 65,000 acres of  
 19 tidal and 1,200 acres of nontidal wetland or open water. Impacts on wetlands from CM1  
 20 construction would occur in the first 10 years after BDCP approval. Approximately 19,550 acres of  
 21 this wetland restoration would occur during this time period, thereby offsetting the impacts of CM1  
 22 construction. These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for  
 23 Alternative 1B (552 acres). Therefore, there would be an overall beneficial effect on potential  
 24 jurisdictional wetlands and other waters of the United States from BDCP implementation.

25 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
 26 of constructing Alternative 1B water conveyance facilities would be a substantial effect if not  
 27 compensated for by wetland protection and/or restoration. This loss would represent either  
 28 temporary or permanent removal of federally protected wetlands or other waters of the United  
 29 States as defined by Section 404 of the CWA. However, Alternative 1B includes conservation

1 measures (CM4 and CM10) that would restore and protect large acreages of both tidal and nontidal  
2 wetlands and open water. Through the course of the BDCP restoration program, this alternative  
3 would result in restoration of 65,000 acres of tidal and 1,200 acres of nontidal wetlands and open  
4 water. Impacts on wetlands from CM1 construction would occur in the first 10 years after BDCP  
5 approval. Approximately 19,550 acres of this wetland restoration would occur during this time  
6 period, thereby offsetting the impacts of CM1 construction. These acreages greatly exceed the no net  
7 loss (1:1 replacement ratio) requirement for Alternative 1B (552 acres). Therefore, there would be a  
8 beneficial impact on potential jurisdictional wetlands and other waters of the United States from  
9 BDCP implementation.

10 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**  
11 **Wetlands and Other Waters of the United States**

12 The habitat protection and restoration activities associated with Alternative 1B's other conservation  
13 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and Waters of  
14 the US in the study area over the course of BDCP conservation action implementation. Because these  
15 conservation measures have not been defined to the level of site-specific footprints, it is not possible  
16 to delineate and quantify these effects in detail. Several of the conservation measures (CM2, CM4  
17 and CM5) have been described with theoretical footprints for purposes of the effects analysis  
18 contained in Chapter 5 of the BDCP. These theoretical footprints have been used to predict the acres  
19 of natural communities that would be affected through loss or conversion, which gives some  
20 indication of jurisdictional wetland effects. Any CM2–CM10 effects ascribed to tidal perennial  
21 aquatic, tidal brackish emergent, tidal freshwater emergent, other natural seasonal, nontidal  
22 freshwater perennial emergent, and nontidal perennial aquatic wetlands natural communities are  
23 likely to also be effects on wetlands and other waters of the United States. Effects ascribed to other  
24 natural communities and land cover types with small jurisdictional wetland components  
25 (valley/foothill riparian, alkali seasonal wetland complex, vernal pool complex, managed wetland,  
26 grassland and cultivated land) are not easily converted to effects on wetlands and other Waters of  
27 the US by the use of theoretical footprints. Because of this lack of detail, a programmatic assessment  
28 is provided for these other conservation measures.

29 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland  
30 natural communities through implementation of CM2–CM10 for Alternative 1B would be in the  
31 range of 5,500 to 6,000 acres, assuming that 100 percent of the predominantly wetland natural  
32 communities listed in Table 12-1B-69 and that 10 percent of all of the non-wetland natural  
33 communities listed in that table would qualify as wetlands or other waters of the United States  
34 under the CWA. Most of these wetlands would be converted to tidal and nontidal wetlands and open  
35 water through implementation of CM4, and CM10. The wetlands and open water created by these  
36 two restoration actions would be approximately 66,200 acres, far exceeding what is required under  
37 the no net loss policy used by the USACE in considering Section 404 permits, even if one were to  
38 assume that all conversions represented a functional wetland loss. Therefore, there would be a  
39 beneficial effect on potential jurisdictional wetlands and other waters of the United States from  
40 implementing CM2–CM10.

41 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
42 of implementing the other conservation measures (CM2–CM10) of Alternative 1B would be a  
43 significant adverse impact if not compensated for by wetland protection and/or restoration. This  
44 loss would represent a removal of federally protected wetlands or other waters of the United States  
45 as defined by Section 404 of the CWA. However, Alternative 1B includes conservation measures

1 (CM4 and CM10) that would restore large acreages of both tidal and nontidal wetlands and open  
2 water in the study area. Over the life of the BDCP restoration program, this alternative would result  
3 in restoration of 66,200 acres of tidal and nontidal wetlands and open water, of which 19,550 acres  
4 would be restored in the first 10 years. These acreages greatly exceed the no net loss (1:1  
5 replacement ratio) requirement for Alternative 1B (5,500–6,000 acres). Therefore, there would be a  
6 beneficial impact on potential jurisdictional wetlands and other waters of the United States from  
7 implementing CM2–CM10.

## 8 **Shorebirds and Waterfowl**

9 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,  
10 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for  
11 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for  
12 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to  
13 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to  
14 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether  
15 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture  
16 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts  
17 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat  
18 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of  
19 population abundance objectives and the use of species-habitat models to link population objectives  
20 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives  
21 into habitat objectives, while explicitly identifying the biological assumptions that underpin these  
22 models and the data used to populate them. As a result, the CVJV's biological planning provides a  
23 framework for evaluating the effects of the BDCP on waterfowl.

24 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all  
25 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,  
26 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The  
27 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn  
28 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food  
29 supplies for geese would still be well in excess of demand even with the loss of these agricultural  
30 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives  
31 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of  
32 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly  
33 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging  
34 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to  
35 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report  
36 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model  
37 used to quantify effects on food biomass and food quality.

38 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and  
39 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase  
40 and decrease in natural communities known to provide important foraging, roosting, and breeding  
41 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley  
42 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural  
43 community losses and gains were then translated into species-specific outcomes, comparing the  
44 relative habitat value of each BDCP natural community for each Central Valley shorebird species  
45 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF

1 International 2013) was modified from a table in Stralberg et. al (2010). The table was created using  
2 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and  
3 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

4 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**  
5 **Water Conveyance Facilities Construction**

6 Development of the water conveyance facilities (CM1) would result in the permanent removal of  
7 approximately 6 acres of managed wetland, 8 acres of tidal wetlands, 24 acres of nontidal wetlands,  
8 and 4,091 acres of suitable cultivated lands (including grain and hay crops, pasture, field crops, rice,  
9 and idle lands). In addition, 18 acres of managed wetland, 11 acres of tidal wetlands, 11 acres of  
10 nontidal wetlands and 7,470 acres of suitable cultivated lands would be temporarily impacted.  
11 These losses of habitat would occur within the first 10 years of Alternative 1B implementation in the  
12 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice  
13 cultivated lands, 200 acres of rice, and 700 acres of rice or "rice equivalent" natural communities  
14 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would  
15 be created, protected, and enhanced, 8,850 acres of freshwater tidal wetlands would be restored,  
16 and 2,000 acres of tidal brackish emergent wetland would be restored (Table 3-4, Chapter 3).

17 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were  
18 present in or adjacent to work areas and could result in destruction of nests or disturbance of  
19 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
20 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on  
21 nesting birds.

22 **NEPA Effects:** Habitat loss from construction of the Alternative 1B water conveyance facilities would  
23 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural  
24 communities and cultivated lands that would be restored and protected in the near-term timeframe.  
25 If waterfowl were present in or adjacent to work areas, construction activities could result in  
26 destruction or nests or disturbance of nesting and foraging behaviors, which would be an adverse  
27 effect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*  
28 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
29 effects on nesting birds.

30 **CEQA Conclusion:** Habitat loss from construction of the Alternative 1B water conveyance facilities  
31 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of  
32 natural communities and cultivated lands that would be restored and protected in the near-term  
33 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could  
34 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a  
35 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
36 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a  
37 less-than-significant level.

38 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
39 **Disturbance of Nesting Birds**

40 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**  
2 **Implementation of Conservation Components**

3 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated  
4 8,818 acres as a result of Alternative 1B. This would represent a 25% decrease in managed seasonal  
5 wetlands compared with long-term conditions without Alternative 1B (Ducks Unlimited 2013,  
6 Table 5). There is considerable uncertainty about the biomass and nutritional quality of waterfowl  
7 foods produced in the Suisun's managed wetlands, which makes it difficult to identify the amount of  
8 mitigation needed. To address this uncertainty, three levels of food biomass and three levels of  
9 nutritional quality were modeled for these existing habitats (Ducks Unlimited 2013, Table 7). Three  
10 mitigation scenarios were based on these energetic assumptions of biomass and food quality were  
11 then run to determine a minimum acreage of managed seasonal wetlands to be protected and  
12 enhanced to compensate for the loss of productivity from habitat conversion to tidal wetlands.

- 13 • Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low  
14 food quality. Under this assumption, the managed seasonal wetlands in Suisun produce 50% of  
15 the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds have  
16 60% of the metabolizable energy of seeds produced outside of Suisun. Given the assumption  
17 that managed seasonal wetlands in Suisun could be enhanced to provide high food biomass and  
18 high food quality (equal to wetlands in the Central Valley), 5,000 acres of managed wetlands  
19 protected and managed for high biomass and high food quality would mitigate the conversion of  
20 8,857 acres of managed seasonal wetland to tidal marsh.
- 21 • Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and  
22 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun produce  
23 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds  
24 have 80% of the metabolizable energy of seeds produced outside of Suisun. Given the  
25 assumption that managed seasonal wetlands in Suisun could be enhanced to provide high food  
26 biomass and high food quality (equal to wetlands in the Central Valley), 13,300 acres of  
27 managed wetlands protected and managed for high biomass and high food quality would  
28 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 29 • Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low  
30 food quality. Given the assumption that managed seasonal wetlands in Suisun could only be  
31 enhanced to provide medium food biomass and medium food quality (produce 75% of the seed  
32 biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds have 80% of the  
33 metabolizable energy of seeds produced outside of Suisun), 8,800 acres of managed wetlands  
34 protected and managed for medium biomass and medium food quality would mitigate the  
35 conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

36 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed  
37 seasonal wetlands in Suisun to compensate for the loss of productivity from habitat conversion to  
38 tidal marsh. This minimum commitment of 5000 acres would mitigate the reduced productivity  
39 from conversion of managed seasonal wetlands under the assumptions that 1) existing managed  
40 seasonal wetlands on average in Suisun provide low biomass and low-quality food to wintering  
41 waterfowl and 2) protected seasonal wetlands can be managed to produce high biomass and high  
42 food quality. However, the food biomass and productivity in Suisun Marsh would need to be  
43 quantified in order to determine if the 5,000 acres was sufficient to avoid an adverse effect on  
44 wintering waterfowl in the Suisun Marsh, or if additional mitigation would be needed. Mitigation

1 Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*,  
2 would be available to address this adverse effect.

3 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000  
4 acres of palustrine tidal wetlands in the Delta Watershed, and the replacement of 600 acres of  
5 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo Watershed  
6 would not be expected to have an adverse effect on food productivity, under the assumption that  
7 these wetlands would provide adequate food sources. However, a monitoring component and a food  
8 study in these tidal habitats would be necessary order to demonstrate that there is a less-than-  
9 significant loss of food value in these habitats for wintering waterfowl. If it is determined from  
10 monitoring, that there is in fact a significant loss in food productivity from habitat conversion to  
11 tidal wetlands, the protection and enhancement of managed wetlands in these watersheds would be  
12 required to mitigate the change in food biomass and quality. Mitigation Measure BIO-179b, *Conduct*  
13 *Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and*  
14 *Delta Basins*, would be available to address this uncertainty.

15 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of  
16 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
17 the level of effect that Alternative 1B habitat loss or conversion would have. The BDCP has  
18 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in  
19 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal  
20 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.  
21 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
22 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing  
23 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food  
24 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high  
25 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would  
26 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 1B to avoid  
27 an adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a,  
28 *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to  
29 address this adverse effect.

30 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
31 wetlands in the Delta Watershed, and the replacement of 600 acres of managed seasonal wetlands  
32 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
33 food productivity for wintering waterfowl. However, the conclusion that these wetlands would  
34 provide adequate food sources is entirely dependent on assumptions about food production in  
35 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*  
36 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be  
37 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

38 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of  
39 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
40 the level of impact that Alternative 1B habitat loss or conversion would have. The BDCP has  
41 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in  
42 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal  
43 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.  
44 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
45 productivity resulting from conversion of managed seasonal wetlands under the assumptions that



1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 1B to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential significant impact.

The replacement of 1,400 acres of managed seasonal wetland with 19,000 acres of palustrine tidal wetlands in the Delta Watershed, and the replacement of 600 acres of managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo Watershed would not be expected to alter food productivity for wintering waterfowl. However, the conclusion that these tidal wetlands would provide adequate food sources is entirely dependent on assumptions about food production in palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are needed to confirm that no mitigation for wintering waterfowl is required in the Yolo and Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant level.

#### **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh**

Poorly managed wetlands (considered low biomass and food quality) will be identified and managed by BDCP proponents to improve food quality and biomass. Studies will be required to quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to measure changes in the energetic productivity of these sites. Based on the food studies and monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with the protection and management of managed wetlands in perpetuity. If monitoring demonstrates that additional acreage is needed to meet this goal, additional acreage of protection or creation of managed wetlands and management will be required.

#### **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies show that the assumption of no effect was inaccurate, and the food quality goal of 1:1 compensation for wintering waterfowl food value is not met, additional acreage of protection or creation of managed wetland and management will be required.

1 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**  
2 **of Conservation Components**

3 **Yolo and Delta Basins:** Alternative 1B would reduce managed wetlands in the Yolo and Delta  
4 basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands  
5 are managed as semi-permanent wetlands, Alternative 1B would reduce semipermanent wetlands  
6 in the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. While a reduction in  
7 these semipermanent habitats would represent a habitat loss for breeding waterfowl, with the  
8 restoration of 24,000 acres of palustrine tidal wetlands (Table 3-4, Chapter 3) in the Yolo and Delta  
9 basins there would be a less than adverse effect on breeding waterfowl. These palustrine habitats  
10 would presumably contain water during the breeding period (i.e., March through July), and would  
11 be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in the  
12 Yolo and Delta watersheds attributed to Alternative 1B.

13 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640  
14 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.  
15 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset  
16 the loss of breeding habitat, but this could further reduce food supplies available to wintering  
17 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
18 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

19 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded  
20 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000  
21 acres of semipermanent wetlands that would be protected and enhanced for wintering and  
22 migratory waterfowl (Table 3-4, Chapter 3; Objective MWNC1.1 in BDCP Chapter 3, *Conservation*  
23 *Strategy*).

24 Food studies and monitoring would be necessary to determine how increases in tidal marsh and  
25 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be  
26 needed in order to quantify impacts on breeding waterfowl in Suisun Marsh and to determine not  
27 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for  
28 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*  
29 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the  
30 uncertainty of this effect.

31 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains  
32 several key upland areas that have significant nesting value. The largest block of upland habitat in  
33 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the  
34 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area  
35 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities  
36 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this  
37 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints  
38 were changed during the implementation process of BDCP to overlap with this area, the effects on  
39 breeding waterfowl would likely be greatly increased.

40 **NEPA Effects:** Alternative 1B would reduce managed wetlands in the Yolo and Delta basins by 437  
41 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands are managed  
42 as semi-permanent wetlands, Alternative 1B would reduce semi-permanent wetlands in the Yolo  
43 and Delta drainage basins by 77 acres and 203 acres, respectively. The reduction in these semi-  
44 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the

1 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1B  
2 would not have an adverse effect on breeding waterfowl. These palustrine habitats would  
3 presumably contain water during the breeding period (March through July), and would be expected  
4 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta  
5 watersheds attributed to Alternative 1B. Total managed wetlands in Suisun Marsh would decline  
6 from 41,012 acres to 30,640 acres with the conversion of managed seasonal and semi-permanent  
7 wetlands to tidal habitats. Some of the remaining seasonal wetlands could be managed as semi-  
8 permanent wetlands to offset the loss of breeding habitat, but such management could further  
9 reduce food supplies available to wintering waterfowl under the assumption that semi-permanent  
10 wetlands provide few food resources compared with seasonally managed habitats. The protection  
11 and enhancement of 1,600 acres of permanently flooded managed wetlands would provide habitat  
12 for breeding waterfowl. However, food studies and monitoring would be necessary to determine  
13 how increases in tidal marsh and salinity levels would affect the overall reproductive capacity of the  
14 marsh. Therefore, the loss of breeding waterfowl habitat resulting from implementation of  
15 Alternative 1B could have an adverse effect. Mitigation Measure BIO-180, *Conduct Food and*  
16 *Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the  
17 uncertainty of model assumptions and the potential adverse effect of habitat conversion on breeding  
18 waterfowl in Suisun Marsh.

19 **CEQA Conclusion:** Alternative 1B would reduce managed wetlands in the Yolo and Delta basins by  
20 437 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands are  
21 managed as semi-permanent wetlands, Alternative 1B would reduce semipermanent wetlands in  
22 the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. The reduction in these  
23 semi-permanent habitats would represent a habitat loss for breeding waterfowl. However, with the  
24 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1B  
25 would have a less-than-significant impact on breeding waterfowl. These palustrine habitats would  
26 presumably contain water during the breeding period (March through July), and would be expected  
27 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta  
28 watersheds attributed to Alternative 1B.

29 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the  
30 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the  
31 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of  
32 breeding habitat, but this management could further reduce food supplies available to wintering  
33 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
34 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of  
35 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,  
36 food studies and monitoring would be necessary to determine how increases in tidal marsh and  
37 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or  
38 conversion of habitat from implementation of Alternative 1B could have a significant impact on  
39 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food*  
40 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of  
41 model assumptions and reduce the impact to a less-than-significant level.

#### 42 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding** 43 **Waterfowl in Suisun Marsh**

44 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on  
45 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine

1 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of  
2 the marsh.

3 The required studies will examine how increases in tidal marsh and salinity levels will affect the  
4 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be  
5 limited to the following questions:

- 6 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus  
7 managed habitats and across salinity gradients?
- 8 • How does waterfowl nest success and nest density vary with respect to tidal versus  
9 managed habitats and across salinity gradients?
- 10 • What are the patterns of habitat selection and movements by waterfowl broods in relation  
11 to tidal vs. managed habitats, and are there impacts on duckling survival?
- 12 • What is the current relationship between waterfowl reproductive success and interactions  
13 with alternate prey and predators, and how is tidal restoration likely to alter these  
14 relationships?

### 15 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from the Implementation of** 16 **Conservation Components**

17 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat  
18 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of  
19 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,  
20 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide  
21 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford  
22 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of  
23 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and  
24 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type  
25 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the  
26 majority of shorebird species require water depths of approximately 10–20 cm for foraging (Isola et  
27 al. 2000, Hickey et al. 2003).

#### 28 ***Managed Wetlands***

29 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo  
30 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of  
31 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by  
32 construction-related activities associated with tidal restoration (CM4) and fisheries enhancement  
33 activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and  
34 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could  
35 periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of  
36 1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs (Table 5.4-2, in BDCP Chapter  
37 5, *Effects Analysis*) in the Yolo Basin.

38 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently  
39 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF  
40 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

1 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be  
2 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table  
3 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun  
4 Basin.

5 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
6 managed wetland habitat suitability (Table 1, ICF International International 2013): black-necked  
7 stilt (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher  
8 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),  
9 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a  
10 rank 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and  
11 whimbrel (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

12 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International  
13 International 2013). Most of this loss would occur in Suisun with some additional acreage loss in the  
14 Yolo Basin. The loss of managed wetland habitat for covered species and waterfowl would be  
15 compensated for with 8,200 acres remaining managed wetland protection in Suisun Marsh. Of these  
16 8,200 acres, the 5,000 acres of seasonal wetland protected, enhanced, and managed to provide  
17 overwintering waterfowl foraging habitat would be the habitat type most likely to benefit  
18 overwintering shorebirds. However, the 1,600 acres of semi-permanent and permanent managed  
19 wetlands for breeding waterfowl and 1,500 acres of managed wetlands for salt marsh harvest  
20 mouse would also be expected to have some benefit to wintering and breeding shorebirds.

#### 21 **Cultivated Lands**

22 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities  
23 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272  
24 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and  
25 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an  
26 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512  
27 acres during a notch flow of 6,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*).

28 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration  
29 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an  
30 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted  
31 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the  
32 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

33 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
34 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*  
35 *vociferous*), long-billed curlew, and whimbrel within pasture habitat and sandhill crane was ranked  
36 1 for grain and hay crops. Long-billed dowitcher and killdeer both had a rank 2 for idle crop habitat  
37 suitability and black-bellied plover was ranked 2 for pasture habitat. Red-necked phalarope  
38 (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus tricolor*) were both ranked 2 for grain and  
39 hay crops. Long-billed dowitcher, dunlin, least sandpiper, and long-billed curlew were all ranked 3  
40 for rice habitat suitability and killdeer was ranked 3 for field crop habitat suitability.

41 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in  
42 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,  
43 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated

1 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production  
2 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not  
3 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and  
4 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-  
5 tailed kite, and greater sandhill crane.

6 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while  
7 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF  
8 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's  
9 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

10 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total  
11 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant  
12 garter snake.

### 13 **Tidal Wetlands**

14 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
15 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres  
16 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by  
17 construction-related activities associated with fisheries enhancement activities (CM2) (Table 2, ICF  
18 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in  
19 Yolo Basin.

20 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as  
21 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently  
22 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of  
23 tidal wetlands in Delta Basin.

24 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently  
25 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF  
26 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

27 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
28 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least  
29 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher  
30 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew  
31 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.  
32 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For  
33 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-  
34 billed curlew and whimbrel were both ranked 3 for habitat suitability.

35 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large  
36 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of  
37 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal  
38 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,  
39 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats  
40 would be expected to require management, however, sediment augmentation has been discussed as  
41 an experimental method that could be employed in places like Suisun to combat the loss of intertidal  
42 marshes in the face of sea level rise and reduced sediment supplies.

1 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).  
2 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and  
3 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on  
4 these lands would be likely to be focused on nonnative, invasive species management. Any  
5 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California  
6 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and  
7 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant  
8 garter snake.

### 9 ***Nontidal Wetlands***

10 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
11 within the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119  
12 acres of which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily  
13 lost by construction-related activities associated with Fisheries Enhancement activities (CM2)  
14 (Table 2, ICF International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont  
15 Weir operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically  
16 nontidal perennial aquatic habitat.

17 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted  
18 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International  
19 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5  
20 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from  
21 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

22 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool  
23 complex, would be permanently converted as a result of tidal restoration (CM4); and is not  
24 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural  
25 community type in Suisun Basin.

26 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
27 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and  
28 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for  
29 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat  
30 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal  
31 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial  
32 emergent wetland habitat suitability.

33 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP  
34 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant  
35 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo  
36 Basin (in the Cache Slough area).

37 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be  
38 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss  
39 could be permitted under the Plan. Protection of vernal pool complex natural community would  
40 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).  
41 Protection of these two community types would enhance and manage habitat for vernal pool  
42 crustaceans and alkali-related plant species.

1 The protection and restoration of natural communities would also include management and  
2 enhancement actions under *CM11 Natural Communities Enhancement and Management*. The  
3 following management activities to benefit shorebirds would be considered for implementation  
4 under CM11, in areas where they would not conflict with covered species management.

5 ● Managed wetlands:

- 6 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for  
7 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 8 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize  
9 the extent of shallow-water habitat; varying depths within the wetland unit helps to create  
10 temporal variation in foraging opportunities. During warm, dry springs when wetland units  
11 dry quickly, wetland units can be re-supplied with water to extend habitat availability for  
12 shorebirds.
- 13 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped  
14 edges for nesting shorebirds between April and July.
- 15 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting  
16 and nesting.
- 17 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep  
18 angles.
- 19 ○ Limit levee maintenance during the nesting season (April through July). However, mowing  
20 the center of levees is fine.
- 21 ○ Potentially add material to levees or to islands to encourage nesting for some species.

22 ● Cultivated Lands:

- 23 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote  
24 a diverse community of waterbirds, including shorebirds, during fall migration and winter  
25 (Shuford et al. 2013).
- 26 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a  
27 combination of flooding practices that include one-time water application and maintenance  
28 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 29 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July- September)  
30 can provide substantial benefits to shorebirds at a time of very limited shallow-water  
31 habitat on the landscape (Shuford et al. 2013).
- 32 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to  
33 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because  
34 this practice may not be as effective on soils that drain quickly.
- 35 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to  
36 increase the potential shorebird habitat on intentionally flooded or unflooded fields that  
37 may passively gather rain water (Iglecia et al. 2012).
- 38 ○ Shallowly flood available agricultural fields during July, August, and September to provide  
39 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to  
40 flooding, have minimal micro-topography (e.g. no large clods), and should remain flooded



1 for up to three week periods (after three weeks, vegetation encroachment reduces habitat  
2 value for shorebirds; ICF International 2013).

- 3 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or  
4 drive on levees during the nesting season (April- July, Iglecia et al. 2012).
- 5 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of  
6 wider levees (Iglecia et al. 2012).
- 7 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to  
8 provide nesting habitat for American avocets (Iglecia et al. 2012).
- 9 ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be  
10 more appealing for nesting shorebirds (Iglecia et al. 2012).
- 11 ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
- 12 ○ Islands should be disked along with the rest of the field after harvest to help inhibit  
13 vegetation growth (Iglecia et al. 2012).

14 **NEPA Effects:** Alternative 1B implementation would result in the conversion of managed wetland  
15 and cultivated lands to tidal natural communities, including tidal mudflat. The result would be  
16 substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,  
17 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
18 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
19 willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and  
20 management of the remaining acres would likely have substantial benefits for select species of  
21 wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
22 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
23 and rice types. While the protection, enhancement, and management of these crop types are being  
24 driven by covered species, these management actions would also benefit shorebirds. The protection,  
25 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
26 for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would  
27 be unlikely to compensate for the overall loss. However, with the protection and restoration of acres  
28 in the Delta and Yolo watersheds, in addition to the implementation of the management actions  
29 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not  
30 be expected to result in an adverse effect on shorebird populations in the study area.

31 **CEQA Conclusion:** Alternative 1B implementation would result in the conversion of managed  
32 wetland and cultivated lands to tidal natural communities, including tidal mudflat. The result would  
33 be significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,  
34 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
35 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
36 willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and  
37 management of the remaining acres would likely have substantial benefits for select species of  
38 wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
39 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
40 and rice types. While the protection, enhancement, and management of these types are being driven  
41 by covered species, these management actions would also benefit shorebirds. The protection,  
42 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
43 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be  
44 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in

1 the Delta and Yolo watersheds, in addition to the implementation of the management actions  
2 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be  
3 expected to have a less-than-significant impact on shorebird populations in the study area.

4 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical**  
5 **Transmission Facilities**

6 New transmission lines installed in the study area would increase the risk for bird-power line  
7 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network  
8 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New  
9 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl  
10 species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill*  
11 *Crane* would reduce potential effects through the installation of flight-diverters on new transmission  
12 lines, and selected existing transmission lines in the study area.

13 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power  
14 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the  
15 construction of new transmission lines on shorebird and waterfowl would not be adverse.

16 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl  
17 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential  
18 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-  
19 significant level.

20 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

21 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
22 with construction-related activities could result in temporary disturbances that affect shorebird and  
23 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,  
24 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
25 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging  
26 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on  
27 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
28 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use  
29 of mechanical equipment during water conveyance construction could cause the accidental release  
30 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the  
31 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*  
32 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge  
33 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have  
34 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to  
35 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to  
36 work areas.

37 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
38 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and  
39 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
40 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
41 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
42 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
43 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity

1 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
2 specific effects. Increased methylmercury associated with natural community and floodplain  
3 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as  
4 described in BDCP Appendix 5.D, *Contaminants*).

5 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
6 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
7 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
8 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
9 adaptive management as described in CM12 would be available to address the uncertainty of  
10 methylmercury levels in restored tidal marsh and potential impacts on shorebirds and waterfowl.

11 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
12 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
13 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
14 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
15 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
16 classes within a species. In addition, the effect of selenium on a species can be confounded by  
17 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
18 2009).

19 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
20 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
21 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
22 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
23 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
24 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
25 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
26 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
27 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
28 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
29 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
30 levels of selenium have a higher risk of selenium toxicity.

31 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
32 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
33 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl  
34 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
35 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
36 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
37 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
38 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
39 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
40 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
41 alternative. However, it is difficult to determine whether the effects of potential increases in  
42 selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)  
43 would lead to adverse effects on shorebirds and waterfowl species.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a  
2 substantial effect on shorebirds and waterfowl from increases in selenium associated with  
3 restoration activities. This effect would be addressed through the implementation of *AMM27*  
4 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
5 provide specific tidal habitat restoration design elements to reduce the potential for  
6 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
7 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
8 evaluated separately for each restoration effort as part of design and implementation. This  
9 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
10 design schedule.

11 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
12 could reduce shorebird and waterfowl use of modeled habitat adjacent to work areas. Moreover,  
13 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
14 could result in ongoing but periodic postconstruction disturbances that could affect shorebird and  
15 waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these effects, and  
16 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
17 *Nesting Birds*, would be available to address adverse effects on nesting individuals. Tidal habitat  
18 restoration could result in increased exposure of shorebirds and waterfowl to selenium. This effect  
19 would be addressed through the implementation of *AMM27 Selenium Management*, which would  
20 provide specific tidal habitat restoration design elements to reduce the potential for  
21 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects  
22 associated with noise and visual disturbances, and increased exposure to selenium from Alternative  
23 1B implementation would not have an adverse effect on shorebirds and waterfowl. Tidal habitat  
24 restoration is unlikely to have an adverse effect on shorebirds and waterfowl through increased  
25 exposure to methylmercury, as these species currently nest and forage in tidal marshes with  
26 elevated methylmercury levels. However, it is unknown what concentrations of methylmercury are  
27 harmful to species of waterfowl and shorebirds, and the potential for increased exposure would  
28 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and  
29 adaptive management, described in *CM12 Methylmercury Management*, would address the  
30 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other  
31 information is developed, the site-specific planning phase of marsh restoration would be the  
32 appropriate place to assess the potential risk of shorebird and waterfowl exposure to  
33 methylmercury.

34 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a  
35 result of water conveyance facilities construction and operation and maintenance would have a  
36 significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these impacts, and  
37 implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
38 *Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant level. Tidal  
39 habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl species  
40 through increased exposure to methylmercury, as these species currently nest and forage in tidal  
41 marshes with elevated methylmercury levels. However, it is unknown what concentrations of  
42 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans  
43 that address the creation and mobilization of mercury, as well as the monitoring and adaptive  
44 management described in *CM12*, would be the appropriate place to assess the potential risk of  
45 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration  
46 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be

1 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
2 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
3 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1B  
4 implementation would have a less-than-significant impact on shorebirds and waterfowl.

5 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
6 **Disturbance of Nesting Birds**

7 See Mitigation Measure BIO-75 under Impact BIO-75.

8 ***Common Wildlife and Plants***

9 Common wildlife and plants are widespread, often abundant, species that are not covered under  
10 laws or regulations that address conservation or protection of individual species. Examples of  
11 common wildlife and plants occurring in the study area are provided within the discussion for each  
12 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts  
13 on common wildlife and plants would occur through the same mechanisms discussed for natural  
14 communities and special-status wildlife and plants for each alternative.

15 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

16 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are  
17 discussed in the analysis of Alternative 1B effects on natural communities (Impacts BIO-1 through  
18 BIO-31). In general, effects on habitat of common wildlife and plants would not be adverse. Through  
19 the course of implementing the Plan over a 50-year time period, several natural communities and  
20 land cover types would be reduced in size, primarily from restoration of other natural communities.  
21 Grassland, managed wetland and cultivated land would be reduced in acreage, so the common  
22 species that occupy these habitats would be affected. However, the losses in acreage and value of  
23 these habitats would be offset by protection, restoration, enhancement and management actions  
24 contained in the BDCP, including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal*  
25 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel*  
26 *Margin Enhancement*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
27 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10*  
28 *Nontidal Marsh Restoration*, and *CM11 Natural Communities Enhancement and Management*. In  
29 addition, the AMMs contained in Appendix 3.C of the BDCP would be in place to reduce or eliminate  
30 the potential to adversely affect both special-status and common wildlife and plants.

31 Direct effects on common wildlife and plants from constructing water conveyance facilities and  
32 implementing BDCP conservation measures would include construction or inundation-related  
33 disturbances that result in injury or mortality of wildlife or plants and the immediate displacement  
34 of wildlife. Indirect effects include project-related disturbances to nearby wildlife and plants during  
35 construction (e.g., disruption of breeding and foraging behaviors from noise and human activity,  
36 habitat degradation from fugitive dust and runoff) and effects occurring later in time (e.g., collisions  
37 of birds with transmission lines, habitat fragmentation, vegetation management). Indirect effects  
38 could result both from construction and from operations and maintenance (e.g., ground  
39 disturbances could result in the spread and establishment of invasive plants or noxious weeds).

40 ***NEPA Effects:*** The direct and indirect effects associated with constructing water conveyance  
41 facilities and restoring tidal and other habitats as part of implementing Alternative 1B would not be  
42 adverse because the conservation measures and AMMs also expand and protect natural

1 communities, avoid or minimize effects on special-status species, prevent the introduction and  
2 spread of invasive species, and enhance natural communities. These actions would result in avoiding  
3 and minimizing effects on common wildlife and plants as well.

4 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat  
5 restoration activities would have impacts on common wildlife and plants in the study area through  
6 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not  
7 be substantial, because habitat restoration would increase the amount and extent of habitat  
8 available for use by most common wildlife and plant species. Conservation measures to avoid or  
9 minimize effects on special-status species, to prevent the introduction and spread of invasive  
10 species, and to enhance natural communities also would result in avoiding and minimizing effects on  
11 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any  
12 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would  
13 be less than significant. No mitigation would be required.

#### 14 **Wildlife Corridors**

15 ECAs are lands likely to be important to wildlife movement between large, mostly natural areas at  
16 the state wide level. The ECAs form a functional network of wildlands that are considered important  
17 to the continued support of California's diverse natural communities. Four general areas were  
18 identified within the study area that contain ECAs (Figure 12-2). The BDCP also identified important  
19 landscape linkages in the Plan Area to guide reserve design, which can also be seen on Figure 12-2.

#### 20 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

21 Alternative 1B water conveyance facilities would cross one of the ECAs identified during the  
22 analysis, the Stone Lake-Yolo Bypass ECA. The conveyance facilities would also cross four landscape  
23 linkages identified in the BDCP, the *San Joaquin River* linkage (#5 in Figure 12-2), the *Middle River*  
24 linkage (#6 in Figure 12-2), the *Cosumnes to Stone Lakes* linkage (#10 in Figure 12-2), and the *White*  
25 *Slough to Stone Lakes* linkage (#11 in Figure 12-2). Though the conveyance facilities shown on  
26 Figure 12-2 overlap with the line representing the *Sacramento River* linkage (#9 in Figure 12-2) this  
27 line generally represents the course of the Sacramento River and is intended to address the needs of  
28 aquatic species and will thus not be addressed in this chapter.

29 The construction of Intakes 1, 2, 3, and 4, associated borrow and spoil areas, and the canal from east  
30 of Clarksburg to just north of Walnut Grove would occur within the Stone Lake-Yolo Bypass ECA.  
31 These activities would result in the permanent loss of narrow strips of riparian vegetation along the  
32 Sacramento River and the permanent and temporary loss of grasslands and agricultural lands. These  
33 losses would not substantially increase impediments to movement of wildlife that could move from  
34 Stone Lakes to Yolo Bypass because the Sacramento River and Sacramento Deep Water Shipping  
35 Channel already create a barrier to dispersal for nonavian species and the loss of the narrow strips  
36 of riparian vegetation and agricultural lands would generally not impede the movement of bird  
37 species between these areas. However, the construction of the canal and the intakes would create a  
38 substantial barrier to the north-south movement of nonavian terrestrial species in the area between  
39 the Sacramento River and the Southern Pacific Dredger Cut west of Stone Lakes, as well as the east-  
40 west movement between Stone Lakes and the east bank of the Sacramento River. There are records  
41 of Swainson's hawk, western pond turtle, and American badger that would be affected by  
42 construction of the canal (California Department of Fish and Wildlife 2013). Though there would be  
43 losses in Swainson's hawk foraging habitat and potential nesting habitat in these areas, these losses

1 would not substantially impede the movements of Swainson's hawks in the area. The loss in habitat  
2 is addressed in the Swainson's hawk effects analysis.

3 The addition of new permanent transmission lines within the Stone Lake-Yolo Bypass ECA could  
4 adversely affect birds during periods of low visibility. Sandhill cranes that are known to roost at  
5 Stones Lakes could particularly be adversely affected by the addition of the north-south running  
6 transmission line to the west of Stone Lakes.

7 The canal and a borrow and spoils area that occur adjacent to the *Cosumnes to Stone Lakes* linkage,  
8 which is identified in the BDCP for reserve planning to benefit greater sandhill crane movement  
9 from north to south in the Plan Area, could be in conflict with future reserve planning in this area  
10 (see impact discussions for greater and lesser sandhill cranes).

11 The portion of the canal and associated borrow and spoils area that cross the *White Slough to Stone*  
12 *Lakes* linkage, which is identified in the BDCP for reserve planning to connect the White Slough  
13 population of giant garter snake to habitat in the Stone Lakes area, would conflict with BDCP's  
14 reserve design planning as well limiting connectivity under Existing Conditions by creating a  
15 substantial barrier to movement across this landscape.

16 Alternative 1B would also cross the *Middle River* and *San Joaquin River* linkages. These linkages were  
17 established to guide riparian restoration and protection along the Middle River and San Joaquin  
18 River to improve riparian connectivity for the benefit of riparian brush rabbit, riparian woodrat,  
19 least Bell's vireo, yellow-breasted chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite.  
20 Though the canal siphons below both of these river crossings, the adjacent canal, borrow and spoils  
21 areas, RTM storage areas, and permanent transmission line would remove existing riparian  
22 vegetation at these locations and conflict with the BDCP's plans for establishing habitat connectivity  
23 along these river corridors through restoration and preservation.

24 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*  
25 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*  
26 *Restoration*). These activities would generally improve the movement of wildlife within and outside  
27 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and  
28 management of these areas (CM11) would improve and maintain wildlife corridors within the Plan  
29 Area.

30 **NEPA Effects:** Despite the contributions from restoration and protection activities, Alternative 1B  
31 would create substantial barriers to the movement of terrestrial wildlife from the eastern portion of  
32 the study area into the central Delta, to the north-south movement of wildlife between the  
33 Sacramento River and I-5, and create barriers to safe movement of avian species during periods of  
34 low visibility. The Alternative 1B conveyance facilities would result in adverse effects on wildlife  
35 corridors.

36 **CEQA Conclusion:** Alternative 1B water conveyance facilities would create a substantial barrier to  
37 the north-south movement of terrestrial species in the area between the Sacramento River and the  
38 Southern Pacific Dredger Cut west of Stone Lakes, as well as the east-west movement between Stone  
39 Lakes and the east bank of the Sacramento River within the Stone Lakes-Yolo Bypass ECA.

40 The addition of new permanent transmission lines within the Stone Lake-Yolo Bypass ECA could  
41 adversely affect birds during periods of low visibility. Sandhill cranes that are known to roost at  
42 Stones Lakes could particularly be adversely affected by the addition of the north-south running  
43 transmission line to the west of Stone Lakes.

1 The canal, associated borrow and spoils areas, RTM storage areas, and permanent transmission  
2 lines would conflict with the BDCP's reserve design planning for greater sandhill crane, giant garter  
3 snake, and covered riparian species.

4 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*  
5 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*  
6 *Restoration*). These activities would generally improve the movement of wildlife within and outside  
7 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and  
8 management of these areas (CM11) would improve and maintain wildlife corridors within the study  
9 area.

10 Despite the contributions from restoration and protection activities, Alternative 1B would create a  
11 substantial barrier to the movement of terrestrial wildlife from the eastern portion of the Plan Area  
12 into the central Delta, to the north-south movement of wildlife between the Sacramento River and I-  
13 5, and create barriers to safe movement of avian species during periods of low visibility. The  
14 Alternative 1B conveyance facilities would result in significant unavoidable impacts on wildlife  
15 corridors. There is no practicable mitigation measure to reduce this impact to a less-than-significant  
16 level.

### 17 **Invasive Plant Species**

18 The invasive plant species that primarily affect each natural community in the study area, which  
19 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed  
20 in Section 12.1.4, *Invasive and Noxious Plant Species*. Invasive species compete with native species  
21 for resources and can alter natural communities by altering fire regimes, hydrology (e.g.,  
22 sedimentation and erosion), light availability, nutrient cycling, and soil chemistry, but also have the  
23 potential to harm human health and the economy by adversely affecting natural ecosystems, water  
24 delivery, flood protection systems, recreation, agricultural lands, and developed areas (Randall and  
25 Hoshovsky 2000). The construction and restoration activities covered under the BDCP could result  
26 in the introduction or spread of invasive plant species by creating temporary ground disturbance  
27 that provides opportunities for colonization by invasive plants in the study area.

28 The primary mechanisms for the introduction of invasive plants as the result of implementation of  
29 Alternative 1B are:

- 30 ● Grading, excavation, grubbing, and placement of fill material.
- 31 ● Breaching, modification, or removal of existing levees and construction of new levees.
- 32 ● Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,  
33 electric transmission and gas lines, irrigation infrastructure).
- 34 ● Maintenance of infrastructure.
- 35 ● Removal of existing vegetation and planting/seeding of vegetation.
- 36 ● Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 37 ● Dredging waterways.

38 Clearing operations and the movement of vehicles, equipment, and construction materials in the  
39 study area would facilitate the introduction and spread of invasive plants by bringing in or moving  
40 seeds and other propagules. These effects would result from:



- 1 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork  
2 operations are complete.
- 3 • Importing, distributing, storing, or disposing of fill, borrow, spoil, or dredge material.
- 4 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of  
5 construction staff.
- 6 • Transport of construction materials and equipment within the study area and to/from the study  
7 area.

8 Table 12-1B-70 lists the acreages of temporary disturbance in each natural community in the study  
9 area that would result from implementation of Alternative 1B of the BDCP.

10 **Table 12-1B-70. Summary of Temporary Disturbance in Natural Communities under Alternative 1B**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	160
Tidal brackish emergent wetland	1
Tidal freshwater emergent wetland	12
Valley foothill riparian	162
Grassland	632
Inland dune scrub	0
Alkali seasonal wetland complex	0
Vernal pool complex	0
Other natural seasonal wetland	0
Nontidal freshwater perennial emergent wetland	8
Nontidal perennial aquatic	32
Managed wetlands	62
Cultivated lands	14,109
<b>Total</b>	<b>15,178</b>

11

12 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**  
13 **and Spread of Invasive Plant Species**

14 Under Alternative 1B, the BDCP would have adverse effects on natural communities from the  
15 introduction and spread of invasive plant species through implementation of CM1–CM10 and CM22  
16 (AMM6). No adverse effects are expected from implementation of CM11–CM21.

- 17 • *CM1 Water Facilities and Operations*: Construction of the Alternative 1B water conveyance  
18 facilities would result in the temporary disturbance of 13,133 acres that would provide  
19 opportunities for colonization by invasive plant species.
- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
21 enhancements would result in the temporary disturbance of 758 acres that would provide  
22 opportunities for colonization by invasive plant species. Vegetation maintenance activities for  
23 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;  
24 however, the clearing of linear areas to facilitate water flow may also result increased  
25 opportunities for invasion. Sediment removal, transportation, and application as a source

1 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance  
2 activities could also result in the spread of invasives if the sediment contains viable invasive  
3 plant propagules.

- 4 ● *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural  
5 communities located in the eleven CZs would result in the temporary disturbance of restoration  
6 areas that would provide opportunities for colonization by invasive plant species.
- 7 ● *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of  
8 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish  
9 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would  
10 provide opportunities for colonization by invasive plant species. These adverse effects would be  
11 reduced by designing restoration projects to minimize the establishment of nonnative  
12 submerged aquatic vegetation, and early restoration projects would be monitored to assess the  
13 response of nonnative species to restoration designs and local environmental conditions. If  
14 indicated by monitoring results, the BDCP Implementation Office would implement invasive  
15 plant control measures in restored natural communities to help ensure the establishment of  
16 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively  
17 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural  
18 community restoration sites.
- 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
20 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and  
21 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for  
22 colonization by invasive plant species.
- 23 ● *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were  
24 not estimated because specific locations for this activity and their areal extent have not been  
25 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut  
26 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and  
27 salmonid migration channels in the interior Delta) would result in the temporary disturbance of  
28 channel areas that would provide opportunities for colonization by invasive plant species.
- 29 ● *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat  
30 would result in the temporary disturbance of riparian areas that would provide opportunities  
31 for colonization by invasive plant species.
- 32 ● *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZ 1, CZ 8  
33 and/or CZ 11 would result in the temporary disturbance of degraded grassland or cultivated  
34 land that would provide opportunities for colonization by invasive plant species.
- 35 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: The restoration of vernal pool  
36 and alkali seasonal wetland complexes in CZ 1, CZ 8, or CZ 11 would result in the temporary  
37 disturbance of grassland areas that would provide opportunities for colonization by invasive  
38 plant species.
- 39 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through  
40 conversion of agricultural lands in CZ 2 and CZ 4, would result in the temporary disturbance of  
41 fallow agricultural areas that would provide opportunities for colonization by invasive plant  
42 species. These adverse effects would be reduced by monitoring the development of marsh  
43 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the  
44 establishment of native marsh vegetation or if restoration success could be improved with

1 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation  
2 control measures and supplemental plantings would be implemented.

- 3 • *CM22 Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
4 *Material, and Dredged Material* would have adverse effects if spoil, RTM, dredged material, or  
5 chipped vegetative materials containing viable invasive plant propagules are used as topsoil in  
6 uninfested areas.

7 The adverse effects that would result from the introduction and spread of invasive plants through  
8 colonization of temporarily disturbed areas would be minimized by implementation of CM11,  
9 AMM4, AMM10, and AMM11.

10 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by  
11 implementing invasive plant control within the BDCP reserve system to reduce competition on  
12 native species, thereby improving conditions for covered species, ecosystem function, and native  
13 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy  
14 to control or the most ecologically damaging nonnative plants for which effective suppression  
15 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,  
16 perennial pepperweed, barbgrass, and rabbits foot grass would be controlled (and tidal mudflats  
17 would be maintained). In riparian areas, invasive plant control would focus on reducing or  
18 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In  
19 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the  
20 cover of invasive plant species.

21 Implementation of AMM4, AMM10 and AMM11 in CM22 would also reduce the adverse effects that  
22 could result from construction activities. The AMMs provide methods to minimize ground  
23 disturbance, guidance for developing restoration and monitoring plans for temporary construction  
24 effects, and measures to minimize the introduction and spread of invasive plants. AMM4 would  
25 include the preparation and implementation of an erosion and sediment control plan that would  
26 control erosion and sedimentation and restore soils and vegetation in affected areas. The  
27 restoration and monitoring plans for implementation of AMM10 would include methods for  
28 stockpiling, storing, and restoring topsoil, revegetating disturbed areas, monitoring and  
29 maintenance schedules, adaptive management strategies, reporting requirements, and success  
30 criteria. AMM10 would also include planting native species appropriate for the natural community  
31 being restored, with the exception of some borrow sites in cultivated lands that would be restored  
32 as grasslands.

33 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed  
34 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas  
35 to be cleared do contain invasive plants, then chipped vegetation material from those areas would  
36 not be used for erosion control but would be disposed to minimize the spread of invasive plant  
37 propagules (e.g., burning, composting). During construction of the water conveyance facilities and  
38 construction activities associated with the other CMs, construction vehicles and construction  
39 machinery would be cleaned prior to entering construction sites that are in or adjacent natural  
40 communities other than cultivated lands and prior to entering any BDCP restoration sites or  
41 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads  
42 through areas with infestations of invasive plant species would be cleaned before travelling to other  
43 parts of the Plan Area. Cleaning stations would be established at the perimeter of BDCP covered  
44 activities along construction routes as well as at the entrance to reserve system lands. Biological  
45 monitoring would include locating and mapping locations of invasive plant species within the

1 construction areas during the construction phase and the restoration phase. Infestations of invasive  
2 plant species would be targeted for control or eradication as part of the restoration and revegetation  
3 of temporarily disturbed construction areas.

4 **NEPA Effects:** The implementation of AMM4, AMM10, AMM11, and CM11 would reduce the  
5 potential for the introduction and spread of invasive plants and avoid or minimize the potential  
6 effects on natural communities and special-status species; therefore, these effects would not be  
7 adverse.

8 **CEQA Conclusion:** Under Alternative 1B, impacts on natural communities from the introduction or  
9 spread of invasive plants as a result of implementing Alternative 1B would not result in the long-  
10 term degradation of a sensitive natural community due to substantial alteration of site conditions  
11 and would, therefore, be less than significant. No mitigation would be required.

## 12 **Compatibility with Plans and Policies**

### 13 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 14 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 15 **Addressing Terrestrial Biological Resources in the Study Area**

16 Constructing the water conveyance facilities (CM1) and implementing CM2–CM22 for Alternative 1B  
17 have the potential for being incompatible with plans and policies related to managing and protecting  
18 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and  
19 executive orders that are relevant to actions in the study area provide guidance for terrestrial  
20 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan  
21 and policy compatibility evaluates whether Alternative 1B would be compatible or incompatible  
22 with such enactments, rather than whether impacts would be adverse or not adverse, or significant  
23 or less than significant. If the incompatibility relates to an applicable plan, policy, or executive order  
24 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be  
25 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such  
26 physical effects of Alternative 1B on terrestrial biological resources are addressed in the discussions  
27 of impacts on natural communities and species. The following is a summary of compatibility  
28 evaluations related to terrestrial biological resources for laws, plans, policies, and executive orders  
29 relevant to the BDCP.

#### 30 **Federal and State Legislation**

- 31 • The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,  
32 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain  
33 legal guidance that either directly or indirectly promotes or stipulates the protection and  
34 conservation of terrestrial biological resources in the process of undertaking activities that  
35 involve federal decision making. The biological goals and objectives contained in the BDCP that  
36 provide the major guidance for implementing the various conservation elements of Alternative  
37 1B are all designed to promote the long-term viability of the natural communities, special-status  
38 species, and common species that inhabit the Plan Area. While some of the conservation  
39 measures of the alternative involve permanent and temporary loss of natural communities and  
40 associated habitats during facilities construction and expansion of certain natural communities,  
41 the long-term guidance in the Plan would provide for the long-term viability and expansion of  
42 the habitats and special-status species populations in the Plan Area. Alternative 1B conservation

1 actions would be compatible with the policies and directives for terrestrial biological resources  
2 contained in these federal laws.

- 3 ● *The California Endangered Species Act, California Native Plant Protection Act, Porter-Cologne*  
4 *Water Quality Control Act, and Natural Communities Conservation Planning Act* are state laws  
5 that have relevance to the management and protection of terrestrial biological resources in the  
6 study area. Each of these laws promotes consideration of wildlife and native vegetation either  
7 through comprehensive planning or through regulation of activities that may have an adverse  
8 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis  
9 for Alternative 1B, contains biological goals and objectives that have been developed to promote  
10 the species protection and natural resource conservation that are directed by these state laws.  
11 Alternative 1B conservation actions would be compatible with the policies and directives  
12 contained in these laws.
- 13 ● *The Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the  
14 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the  
15 maintenance and protection of natural resources and the protection of agricultural land uses in  
16 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use  
17 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state  
18 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of  
19 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological  
20 goals and objectives would be compatible with these LURMP goals (Delta Protection  
21 Commission 2010).
- 22 ● *The Suisun Marsh Preservation Act of 1974* was designed to protect the Suisun Marsh for long-  
23 term use as wildlife habitat, with a goal of preserving and enhancing the value and diversity of  
24 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration  
25 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh  
26 Preservation Act.

### 27 **Plans, Programs, and Policies**

- 28 ● *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the  
29 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:  
30 provide for a more reliable water supply for California and protect, restore, and enhance the  
31 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances  
32 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an  
33 evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta  
34 Stewardship Council will determine whether the BDCP is compatible with the goals and  
35 objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the  
36 BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.
- 37 ● *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,  
38 promotes a long-term gain in the quantity, value and permanence of wetlands acreages and  
39 values in California. The BDCP conservation measures that provide for a significant expansion of  
40 wetland acreage and value in the Delta and Suisun Marsh are compatible with the intent of the  
41 California Wetlands Conservation Policy.
- 42 ● *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*  
43 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the  
44 major basins of California's Central Valley. The NAWMP is a management plan jointly approved

1 by the United States and Canada in 1986. It contains general guidance from the principal wildlife  
2 management agencies of the two countries for sustaining abundant waterfowl populations by  
3 conserving landscapes through self-directed partnerships (joint ventures) that are guided by  
4 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation  
5 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal  
6 government agencies, and one corporation that have formed a partnership to improve the  
7 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding  
8 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's  
9 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation  
10 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP  
11 Plan Area includes all or portions of three Implementation Plan basins— the Delta, Yolo and  
12 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland  
13 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and  
14 water supplies for wetland management, agricultural land enhancement, farmland easements  
15 that maintain waterfowl food resources on agricultural land, and farmland easements that  
16 buffer existing wetlands from urban and residential growth.

17 Implementation of the Alternative 1B conservation measures would result in significant  
18 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;  
19 however, significant increases in tidal and nontidal wetlands in these basins would be another  
20 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has  
21 included a large managed wetland conservation and enhancement goal for this area. For the  
22 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this  
23 EIR/EIS has added mitigation that would require food production studies and adaptive  
24 management to ensure that the Suisun basin would continue to provide the waterfowl and  
25 shorebird habitat envisioned in the Implementation Plan.

- 26 • *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*  
27 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*  
28 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*  
29 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to  
30 preserve and enhance the natural resource and recreation qualities of these areas.  
31 Implementing Alternative 1B, especially construction of CM1 and CM2 facilities, and land  
32 modification associated with CM4 restoration activities, could create temporary disruptions to  
33 the terrestrial biological resource management activities in these management areas. The  
34 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the  
35 BDCP would be compatible with the long-term management goals of these areas. Proposed  
36 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed  
37 to be compatible with and to complement the current management direction for these areas and  
38 would be required to adapt restoration proposals to meet current policy established for  
39 managing these areas.
- 40 • *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the  
41 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term  
42 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh  
43 Preservation Act. The Suisun Marsh Preservation Agreement (SMPA) was signed in 1987 and  
44 modified in 2005 by DWR, CDFW, Reclamation and the Suisun Resource Conservation District to  
45 establish the mitigation approach in the Marsh for effects of operating the SWP and CVP. The  
46 primary concerns were the effects of CVP and SWP Delta diversions on salinity in the Marsh. The

1 SMPA focused on ways to ensure adequate water quality and quantity for the managed wetlands  
2 and wildlife habitats in the Marsh to assure equal waterfowl values in the Marsh. The Suisun  
3 Marsh Plan (SMP), for which a Final EIS/EIR was released in 2010 by these agencies, provides  
4 for restoration of tidal marsh habitat and enhancement of managed wetland in the Marsh,  
5 maintenance of waterfowl hunting and recreational opportunities in the Marsh, maintenance  
6 and improvement of the Marsh levee system, and protection and enhancement of water quality  
7 for beneficial uses of the Marsh. An integral component of the SMP is balancing continued  
8 managed wetland operation with new tidal wetland restoration to provide improved and  
9 greater habitat for fish and wildlife species. The SMP is a programmatic, long-term plan and  
10 does not include specific projects, project proponents, or funding mechanisms. However, the  
11 SMP relies on tidal restoration to allow for managed wetland operations to continue. The BDCP  
12 would provide a funding mechanism and increased management potential relative to existing  
13 and restored habitats, assisting the SMP in meeting its broader ecological goals, consistent with  
14 long-term operation of the SWP and CVP water conveyance facilities. The conservation actions  
15 contained in the BDCP, which are designed to ensure the long-term protection and recovery of  
16 special-status fish and wildlife species dependent on the Marsh, would be compatible with the  
17 water quality and habitat restoration goals of the SMPA and SMP.

- 18 ● *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive  
19 species. Implementation of the Plan's long-term control and management objectives affect  
20 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan  
21 objectives are to control and remove invasive aquatic species that are detrimental to native  
22 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be  
23 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative  
24 1B would, therefore, be compatible with the objectives of the California Aquatic Invasive Species  
25 Management Plan.
- 26 ● *Habitat Conservation Plans and Natural Community Conservation Plans* are the subject of a  
27 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP  
28 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

### 29 **Executive Orders**

- 30 ● *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland  
31 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the  
32 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 33 ● *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the  
34 introduction and spread of invasive species in a cost-effective and environmentally sound  
35 manner. Alternative 1B construction and restoration actions have the potential to both  
36 introduce and spread invasive species in the study area. Implementation of mitigation measures  
37 described in this chapter would be capable of making Alternative 1B implementation compatible  
38 with Executive Order 13112.
- 39 ● *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs  
40 federal agencies whose activities affect public land management, outdoor recreation, and  
41 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and  
42 the management of game species and their habitat. Alternative 1B conservation measures that  
43 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and  
44 other natural communities would conflict with the hunting expansion and enhancement aspects

1 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of  
2 alternatives on hunting opportunities. The habitat protection and expansion conservation  
3 measures of Alternative 1B would be compatible with the executive order's goal of facilitating  
4 the management of habitats for some game species.

5 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 1B  
6 identified in the analysis above indicate the potential for a physical consequence to the environment.  
7 The primary physical consequence of concern is the conversion of large acreages of cultivated land  
8 and managed wetland to natural wetland and riparian habitat in the study area. The physical effects  
9 are discussed in the Shorebirds and Waterfowl analysis above and no additional CEQA conclusion is  
10 required related to the compatibility of the alternative with relevant plans and policies. The reader is  
11 referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of  
12 state and federal agencies to comply with local regulations and the relationship between plan and  
13 policy consistency and physical consequences to the environment.

14