

12.0 Readers' Guide and Summary

12.0.6 Summary of Effects

12.0.6.2 Comparison of the Effects of the Alternatives

Effects on Wetlands and Other Waters of the United States

The estimated area of fill of wetlands and other waters of the United States potentially under jurisdiction of the U.S. Army Corps of Engineers (jurisdictional waters) would be largest under Alternative 9 (Table 12-ES-3). Fill of jurisdictional waters would be ~~relatively greater under the west alignment alternatives than under the east alignment or pipeline/tunnel alternatives similar under the east, west, and modified pipeline/tunnel alignments and substantially less under the pipeline tunnel alternatives (1A, 2A, and 6A). The fill under the east alignment and pipeline/tunnel alternatives would be largely overlapping.~~ Of these alternatives, the fill would be largest under Alternative ~~4-2B with the use of 6-foot high RTM storage sites. However, if 10-foot high storage sites were used (see Chapter 3, Section 3.6.1.2, Conveyance Facilities), Alternative 4 would result in the least fill of potential jurisdictional wetlands (Table 12-ES-3).~~ Under Alternatives ~~2D, 4, 4A, and 5A~~ a larger area of nonwetland waters of the United States would be filled ~~than under the other pipeline/tunnel alternatives. due to work in Clifton Court Forebay; however, the forebay would ultimately expand by 450 acres and thus largely offset any losses there.~~ Implementing Alternative 5 would result in the least fill of nonwetland waters of the United States.

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

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

<u>Alternative^a</u>	<u>Wetlands</u>	<u>Other Waters of the U.S.</u>	<u>Total Waters of the U.S.</u>
<u>1A</u>	<u>142</u>	<u>284</u>	<u>426</u>
<u>1B</u>	<u>317</u>	<u>486</u>	<u>803</u>
<u>1C</u>	<u>317</u>	<u>482</u>	<u>799</u>
<u>2A</u>	<u>144</u>	<u>304</u>	<u>448</u>
<u>2B</u>	<u>330</u>	<u>525</u>	<u>855</u>
<u>2C</u>	<u>317</u>	<u>482</u>	<u>799</u>
<u>2D^b</u>	<u>299</u>	<u>527</u>	<u>827</u>
<u>3</u>	<u>134</u>	<u>242</u>	<u>376</u>
<u>4^b</u>	<u>284</u>	<u>491</u>	<u>775</u>
<u>4A^b</u>	<u>284</u>	<u>491</u>	<u>775</u>
<u>5</u>	<u>134</u>	<u>221</u>	<u>355</u>
<u>5A^b</u>	<u>281</u>	<u>470</u>	<u>750</u>
<u>6A</u>	<u>142</u>	<u>284</u>	<u>426</u>
<u>6B</u>	<u>317</u>	<u>486</u>	<u>803</u>
<u>6C</u>	<u>317</u>	<u>482</u>	<u>799</u>
<u>7</u>	<u>139</u>	<u>250</u>	<u>389</u>
<u>8</u>	<u>139</u>	<u>250</u>	<u>389</u>
<u>9^c</u>	<u>231</u>	<u>776</u>	<u>1,007</u>

^a Dark shading= pipeline/tunnel, light shading = east alignment, no shading =west alignment and separate corridors (Alternative 9)

^b Additional temporary impact of 1931 acres to Clifton Court Forebay due to dredging

^c Additional temporary impact of 669 acres to tidal channel, forest, scrub-shrub, and emergent wetland due to dredging effects

3

Alternative ^{a,b}	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) ^{c,d}	109	373	482
4 (10 foot) ^{d,e}	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 ^f	465	584	1,050

Notes:

^a—Fill includes both permanent and temporary effects.

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

^c—Alternative 4 is designed with RTM storage sites 6 feet in height.

^d—Alternative 4 includes 2,026 acres of dredging effects on Clifton Court Forebay not shown in the table.

^e—Estimated acreages affected if RTM storage sites are 10 feet high.

^f—Alternative 9 includes channel dredging of 517 acres of open water in Middle River and Victoria and North Canals not shown in the table.

2

3 12.1 Environmental Setting/Affected Environment

4 12.1.2 Land Cover Types

5 12.1.2.2 Special-Status and Other Natural Communities

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

- 11 • California Environmental Quality Act (CEQA).
- 12 • Section 1602 of the California Fish and Game Code.

- 1 • Section 404 of the Clean Water Act (CWA).
- 2 • California's Porter-Cologne Water Quality Control Act (Porter-Cologne Act).

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

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

21 or potential aquatic habitat (valley/foothill riparian) protected under the CWA and Porter-Cologne
 22 Act. ~~To simplify the permitting processes, the regulated habitat types have been grouped into the~~
 23 ~~following open water and wetland categories:~~

24 The regulated aquatic resources have been grouped into the following wetland and open water
 25 categories (the hydrology-based wetland types originally mapped for the dDraft EIR/EIS have been
 26 reclassified into the following habitat-based types to facilitate the permitting process):

- 27 • Wetlands
 - 28 ○ Perennial
 - 29 • Emergent
 - 30 • Scrub-Shrub
 - 31 • Forest
 - 32 ○ Seasonal
 - 33 • Vernal Pool
 - 34 • Seasonal wetland
 - 35 • Alkaline Wetland

- 1 • Other Waters of the U.S.
- 2 ○ Nontidal
- 3 • Agricultural Ditch
- 4 • Natural Channel
- 5 • Pond
- 6 • Lake
- 7 ○ Tidal
- 8 • Tidal Channel
- 9 • Conveyance
- 10 • Clifton Court Forebay

11 Impacts on waters of the United States discussed later in this document (Section 12.3.3) are
 12 presented in the Wetlands and Other Waters of the U.S. categories listed above. These groupings
 13 ensure that impacts are assessed, and mitigation assigned, to categories of aquatic resources
 14 typically required by regulatory agencies.

15 Open Water

- 16 ○ ~~Nontidal Flow~~
- 17 ○ ~~Muted Tidal Flow~~
- 18 ○ ~~Tidal Flow~~
- 19 ○ ~~Pond or Lake (nontidal)~~
- 20 • ~~Wetland~~
- 21 ○ ~~Nontidal Wetland~~
- 22 ○ ~~Tidal Wetland~~
- 23 ○ ~~Seasonal Wetland~~

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

30 One other natural community (grassland) and two land cover types (cultivated lands and developed
 31 lands) also are present in the study area but are not considered special-status natural communities.
 32 Though some grasslands, cultivated lands, and developed lands provide habitat for special-status
 33 species, as a natural community and a land cover type these areas are not of limited distribution and
 34 do not in themselves require particular regulatory consideration for the vegetation that occurs there
 35 (e.g., these areas are not regulated wetlands). Throughout the remainder of the chapter, these three
 36 community/land cover types are addressed in the context of the other natural communities. The
 37 cultivated lands land cover type is treated as a natural community in the BDCP to meet the
 38 requirements of the Natural Communities Conservation and Protection Act (NCCPA) and to

1 recognize its value to covered species addressed in the Plan. Tidal mudflat, which is listed above, is
 2 not mapped separately, and occurs at the edges between tidal perennial aquatic, tidal freshwater
 3 emergent, and tidal brackish emergent wetland. Therefore, the tidal mudflat natural community is
 4 not addressed separately in detail in this chapter.

5 The study area natural communities are described below, including how each is used by common
 6 and special-status plant and wildlife species. Information on natural communities and associated
 7 plant and wildlife species was summarized from [Draft](#) BDCP Chapter 2, Section 2.3.4, *Natural*
 8 *Communities*. Table 12-2 and Table 12-3 list the special-status species (covered and noncovered
 9 species) supported by these natural communities. The acreages of each natural community within
 10 the Plan Area and this chapter's study area are presented in Table 12-1.

11 12.2 Regulatory Setting

12 12.2.1 Federal Plans, Policies, Regulations, and Executive 13 Orders

14 12.2.1.1 Sections 404 and 401 of the Clean Water Act

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

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

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

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

18 In 2008, the CorpsUSACE and the EPA issued national regulations, known as the “Mitigation Rule”
 19 governing compensatory mitigation for activities authorized by permits issued by the CorpsUSACE
 20 (33 CFR §§Sections 325, 332), and in 2015, the Corps’USACE South Pacific Division issued “Regional
 21 Compensatory Mitigation and Monitoring Guidelines (Final January 12, 2015)” (Division Guidelines)
 22 to supplement the national Mitigation Rule. Compensatory mitigation under the Mitigation Rule and
 23 Division Guidelines fulfill the long standing national goal of replacing the loss of wetland and other
 24 aquatic resource acreages and functions, known as the “no net loss” goal (National Wetlands
 25 Mitigation Action Plan (December 24, 2002)). To achieve the no net loss goal, the CorpsUSACE and
 26 EPA have concluded that, where appropriate and practicable, compensatory mitigation “should
 27 provide, at a minimum one for one functional replacement (i.e., no net loss of values), with an
 28 adequate margin of safety.” The long-term objective of the no net loss policy is to increase wetland
 29 acreages and functions nationally.

30 The Mitigation Rule defines compensatory mitigation as {1} restoring existing wetlands or
 31 reestablishing former wetlands; {2} creating new wetlands in upland areas; {3} enhancing the
 32 functional values of degraded wetlands; and {4} preserving wetlands restoration aquatic resources.
 33 Restoration is generally the preferable form of compensatory mitigation because the likelihood of
 34 success is greater while the impacts to potentially ecologically important uplands are less, as
 35 compared to creation. Moreover, the potential gains in terms of aquatic resources functions are
 36 oftentimes greater with restoration as compared to enhancement and preservation (33 CFR
 37 §Section 332.3(a)(2)). The Mitigation Rule and Division Guidelines stress the benefits of a watershed
 38 approach to compensatory mitigation, and compensatory mitigation generally should be located in
 39 the same watershed as the impact site, and where it is most likely to successfully replace lost
 40 functions and services (33 CFR §Section 332.3; Division Guidelines, §Section 3.2)

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

12.3 Environmental Consequences

12.3.2 Methods for Analysis

12.3.2.4 Methods Used to Assess Wetlands and Other Waters of the United States

The term *waters of the United States* is an encompassing term used by USACE for areas that are subject to federal regulation under Section 404 of the federal Clean Water Act (CWA). Waters of the United States are categorized as *wetlands* or *other waters of the United States*. Each of these categories is described below.

USACE defines *wetlands* as areas that are inundated or saturated by surface water or groundwater at a frequency and duration that is sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3[b]; 40 CFR 230.3). For a wetland to qualify as a jurisdictional aquatic site, and therefore be subject to regulation under CWA Section 404, it must support a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology.

~~On January 9, 2001, a federal court ruling in *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers* (121 S.Ct. 675 [2001]) resulted in a determination that isolated wetlands (e.g., vernal pools) are no longer regulated by USACE under CWA Section 404. Counsel for EPA and USACE published guidance on “[n]on-navigable, isolated [and] intrastate waters” on January 19, 2001, in response to the ruling. The guidance essentially resulted in a determination that USACE does not regulate non-navigable, isolated waters. Jurisdictional status would be considered as part of the wetland delineation and future permitting process for the proposed project.~~

Other waters of the United States are water bodies that are regulated under Section 404 of the CWA but do not typically display all three of the wetland indicators identified above.

As stated in Chapter 3, *Description of Alternatives*, this document is intended to provide project-level CEQA and NEPA analysis for *CM1 Water Facilities and Operation*, and program-level analyses for all other BDCP covered activities. To support the approval of a water conveyance alternative at the project level, it will be necessary to consider its effects on wetlands and waters of the United States at a detailed level. This analysis will be part of the Section 404 Clean Water Act application process, as is needed to support compliance with the Act, and which must occur prior to issuing a Record of Decision for the project’s 404 permit action under terms of NEPA. A jurisdictional wetlands determination has not been undertaken for other elements of the BDCP because more specific detail must be developed for individual conservation actions before a specific area of effect can be identified.

The wetland classification system used to delineate wetlands and waters of the United States for the analysis in this chapter is different from that used to develop natural communities in the BDCP. The BDCP natural communities development process and methods are described in Section 12.3.2.2 of this chapter. ~~The method for mapping and quantifying potential wetlands and waters of the United States for this EIR/EIS was developed and implemented by DWR. Wetland mapping followed protocols developed for the Sacramento-San Joaquin Delta, which were adapted from the Bay Area Aquatic Resources Inventory (BAARI: San Francisco Estuary Institute 2011). DWR used an analysis of electronic geographic data using a Geographic Information System (GIS) to delineate~~

1 potential wetlands within the Conveyance Planning Areas. DWR interpreted digital aerial imagery
2 from 2005-2010 to identify wetland vegetation and other aquatic features. Additional sources of
3 information were also consulted including the CDFW GIS dataset showing vegetation and land use
4 for the Sacramento San Joaquin Delta (“DFG Vegetation GIS”) (Hickson and Keeler-Wolf 2007).
5 digital elevation data (LiDAR), historical aerial imagery available on Google Earth, NRCS soil maps,
6 and the USFWS National Wetland inventory maps.

7 Field data was collected at a limited number of accessible sites in support of this GIS-based
8 determination. DWR environmental scientists conducted wetland delineations following the method
9 in the 1987 Corps of Engineers Wetland Delineation Manual (U.S. Army Corps of Engineers 1987) and
10 the Arid West Supplement (U.S. Army Corps of Engineers 2008). DWR plotted the locations of the
11 field wetland data points on the wetland map. Most data points confirmed the mapped wetland
12 boundaries, but slight adjustments to wetland polygons were made if necessary. The wetland
13 delineation was submitted to the USACE for verification in August 2014. The final verified
14 delineation incorporated changes requested by the USACE.

15 Table 12-6 classifies the potentially jurisdictional wetland and other water types mapped in the
16 Conveyance Planning Areas with the corresponding type from the Cowardin classification system
17 (Cowardin et al. 1979). These wetland features are stored in a geographic feature class within a
18 geodatabase. Descriptions of the mapped wetland types are included below.

19 The method for mapping and quantifying potential wetlands and waters of the US for this EIR/EIS
20 was developed and implemented by DWR. It is based on analysis of electronic geographic data using
21 a Geographic Information System (GIS). Field data was collected at a limited number of accessible
22 sites in support of this GIS-based determination.

23 To determine water conveyance alternatives that may affect jurisdictional wetlands and other
24 waters of the United States, the GIS analysis used a DWR data for the study area and footprints of the
25 water conveyance system alternatives, digital aerial photographs taken from 2005 to 2010, and
26 Natural Resources Conservation Service soil data.

27 DWR used aerial photography interpretation in a GIS to delineate potential wetlands within the
28 Conveyance Planning Areas. Wetland mapping followed protocols developed for the Sacramento-
29 San Joaquin Delta, which were adapted from the Bay Area Aquatic Resource Inventory (BAARI; San
30 Francisco Estuary Institute 2011). To identify photographic signatures of natural hydrology under
31 different precipitation conditions, additional sources of information were also consulted, including
32 the CDFW GIS dataset showing vegetation and land use for the Sacramento San Joaquin Delta (“DFG
33 Vegetation GIS”) (Hickson and Keeler-Wolf 2007), historical aerial imagery available on Google
34 Earth and the USFWS National Wetland Inventory maps.

35 The features of the proposed EIR/EIS alternatives include canals, tunnels, intakes, forebays,
36 pumping plants, staging areas, and borrow and spoil areas and are considered to have either
37 permanent or temporary impacts. These features are stored in a geographic feature class within a
38 geodatabase and were used to determine the surface impact for each alternative.

39 DWR also consulted NRCS soil maps of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and
40 Yolo Counties. The map units associated with hydric soils was overlain on the Plan Area map.

41 Because nearly all of the Plan Area is mapped by NRCS as having hydric soils, DWR used aerial
42 photograph interpretation of vegetation type and landscape position to identify potential
43 jurisdictional wetlands and other waters. Table 12-6 classifies the mapped wetland types with the

1 corresponding type from the Cowardin classification system (Cowardin et al. 1979). Detailed
2 descriptions of the mapped wetland types are included in San Francisco Estuary Institute 2011.

3 Field data were collected at a limited number of accessible sites in support of this GIS-based
4 determination. DWR environmental scientists conducted wetland delineations following the method
5 in the 1987 *Corps of Engineers Wetland Delineation Manual* (U.S. Army Corps of Engineers 1987) and
6 the *Arid West Supplement* (U.S. Army Corps of Engineers 2008) at 26 sites in the spring and summer
7 of 2013. DWR plotted the locations of the field wetland data points on the wetland map and adjusted
8 wetland polygons if necessary.

9 To determine effects resulting from CM1 construction, the GIS data layer of potential jurisdictional
10 wetlands and other waters was intersected with the layer of project footprint surface features for
11 each proposed EIR/EIS alternative. The resulting polygons identify the areas of potential impacts on
12 jurisdictional waters. Acreages of each type of impacted wetland were calculated for each
13 alternative using an Access database tool and are presented in the wetlands and waters of the
14 United States impact discussions in Section 12.3.3. The GIS data layer of wetlands and other waters
15 developed in this process includes all potentially jurisdictional waters, including those waters that
16 may be later determined by USACE to be isolated or otherwise non-jurisdictional. The use of this
17 methodology and the GIS data layer likely results in an overestimation of the wetlands and waters of
18 the United States that would be affected and would require permitting. The construction footprints
19 are expected to be larger than actual design footprints, including the large intake footprints
20 extending into the Sacramento River. Also, the GIS methodology used to assign a footprint to the
21 transmission corridors involved creating a continuous band of effect along the entire alignment
22 rather than attempting to place individual transmission tower footprints along the alignment.
23 Finally, the potential jurisdictional wetlands mapping included a delineation of all agricultural-
24 related ditches and canals; some of these waterways are likely to be determined non-jurisdictional
25 during the permitting process.
26

1 **Table 12-6. ~~Mapped Land Cover Types that are Potentially Jurisdictional~~ Wetlands and Other Waters of the United States**

	<u>Wetland/Water Type</u>	<u>Map Label Codes</u>	<u>Cowardin Code</u>	<u>Type in Draft EIR/EIS</u>
<u>Wetlands</u>				
<u>Perennial</u>	<u>Emergent</u>	<u>EM</u>	<u>PEM Palustrine-emergent</u>	<u>Tidal wetland and nontidal wetland</u>
	<u>Scrub-Shrub</u>	<u>SS</u>	<u>PSS Palustrine-scrub-shrub</u>	<u>Tidal wetland and nontidal wetland</u>
	<u>Forest</u>	<u>FO</u>	<u>PFO Palustrine-forested</u>	<u>Tidal wetland and nontidal wetland</u>
<u>Seasonal</u>	<u>Vernal Pool</u>	<u>VP</u>	<u>PEM2 Palustrine-emergent-nonpersistent</u>	<u>Seasonal wetland</u>
	<u>Seasonal Wetland</u>	<u>SW</u>	<u>PEM Palustrine-emergent</u>	<u>Seasonal wetland</u>
	<u>Alkaline Wetland</u>	<u>AW</u>	<u>PEM Palustrine-emergent or PSS Palustrine-scrub-shrub</u>	<u>Seasonal wetland</u>
<u>Other Waters of the United States</u>				
<u>Nontidal</u>	<u>Agricultural Ditch</u>	<u>AD</u>	<u>R4 Riverine-Intermittent</u>	<u>Nontidal flow</u>
	<u>Natural Channel</u>	<u>CH</u>	<u>R4 Riverine-Intermittent</u>	<u>Nontidal flow</u>
	<u>Depression</u>	<u>DE</u>	<u>PUB Palustrine-unconsolidated bottom</u>	<u>Pond or lake</u>
	<u>Lake</u>	<u>LA</u>	<u>L1UB Lacustrine-Limnetic unconsolidated bottom</u>	<u>Pond or lake</u>
<u>Tidal</u>	<u>Tidal Channel</u>	<u>TC</u>	<u>R1UB Riverine-Tidal-unconsolidated bottom</u>	<u>Tidal flow</u>
	<u>Conveyance</u>	<u>CO</u>	<u>N/A Concrete or rock-lined conveyance channels</u>	<u>Muted tidal flow</u>
	<u>Clifton Court Forebay</u>	<u>CCF</u>	<u>R1UB Riverine-Tidal-unconsolidated bottom</u>	<u>Clifton Court Forebay</u>
<u>Potential Wetland or Other Waters</u>				
	<u>Mapped Land Cover Type</u>	<u>Cowardin Code(s)</u>	<u>Cowardin Type(s)</u>	
<u>Open Water</u>				
<u>Nontidal Flow</u>	<u>Channel unnatural</u>	<u>R4SB5x</u>	<u>Riverine intermittent streambed mud-excavated</u>	
<u>Muted Tidal Flow</u>	<u>Lagoon open water unnatural</u>	<u>R1UBV</u>	<u>Riverine tidal unconsolidated bottom permanently flooded-tidal</u>	
<u>Tidal Flow</u>	<u>Tidal channel</u>	<u>R1UBV</u>	<u>Riverine tidal unconsolidated bottom permanently flooded-tidal</u>	
	<u>Tidal channel unnatural</u>	<u>R1UBVx</u>	<u>Riverine tidal unconsolidated bottom permanently flooded-tidal-excavated</u>	
<u>Pond or Lake (nontidal)</u>	<u>Depression open water unnatural</u>	<u>PUBHh or</u>	<u>Palustrine unconsolidated bottom perm flooded diked/impounded or</u>	
		<u>PUSCh or</u>	<u>Palustrine unconsolidated shore seasonally flooded diked/impounded or</u>	
		<u>PUSKh</u>	<u>Palustrine unconsolidated shore artificially flooded diked/impounded</u>	
	<u>Lacustrine open water unnatural</u>	<u>L1UBH(h) or</u>	<u>Lacustrine limnetic unconsolidated bottom permanently flooded diked/impounded or</u>	
		<u>L2UBH(h) or</u>	<u>Lacustrine littoral unconsolidated bottom permanently flooded diked/impounded or</u>	
		<u>L2USG(h)</u>	<u>Lacustrine limnetic unconsolidated shore seasonally flooded diked/impounded</u>	

2

Potential Wetland or Other Waters	Mapped Land Cover Type	Cowardin Code(s)	Cowardin Type(s)
Wetland			
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.

Perennial Wetlands

Perennial wetlands are dominated by persistent hydrophytic vegetation. Three types of perennial wetlands were mapped in the Project Area based on the growth form of the vegetation. (The types below were designated as Tidal Wetlands or Nontidal Wetlands in the Public-Draft EIR/EIS.)

Emergent Wetland

Emergent wetlands are dominated by emergent marsh plants such as tules and cattails, or native or ruderal hydrophytic herbaceous forbs. Nontidal emergent wetlands occur above the waterline in ditches or other nontidal channels, at the edge of ponds or lakes, or where seepage occurs on the landside of levees. Tidal emergent wetlands occur in the vegetated zone along tidal or muted tidal channels, in areas such as mud flats, waterside levee toes, and in-channel islands.

Scrub-Shrub Wetlands

Scrub-shrub wetlands are dominated by woody vegetation that is less than 6 m tall and includes riparian shrubs such as native blackberries, dogwoods, buttonbush, and California wild rose, as well as willow and cottonwood seedlings or saplings. Scrub-shrub wetlands may occur in depressions or other nontidal areas such as the banks of ditches and the edges of ponds or lakes. This plant community also occurs in tidally influenced areas along tidal channels and on in-channel islands.

Forested Wetlands

Forested wetlands are defined by woody vegetation that is 6 m tall or taller. Riparian trees in the study area include: Goodding's willow, arroyo willow, sandbar willow, and Fremont's cottonwood. Forested wetlands are found in areas with tidal and nontidal water regimes, as described for scrub-shrub wetlands.

Seasonal Wetlands

Three types of seasonal wetlands were mapped in the study area. Seasonal wetlands are usually dry for part of the year and therefore exhibit vegetation that is patchy or not persistent throughout the year. Strongly alkaline or saline conditions may also cause the soil to be barren of vegetation in some areas. (The types below were all designated as Seasonal Wetlands in the Public-Draft EIR/EIS.)

Vernal Pool

Vernal pool wetlands are depressions with an impervious soil horizon close to the surface. These depressions fill with rainwater and may remain inundated through spring or early summer; they often occur in complexes of many small pools that are hydrologically interconnected. Vernal pools support distinct plant species adapted to the characteristic flooding and drying cycles of the habitat.

Seasonal Wetland

A type of seasonal wetland occurs in the central Delta within plowed agricultural fields. Although a system of pumps and drainage ditches controls water levels on the subsided islands, a high water table persists in some areas. Upland crops are planted in the surrounding fields but hydrophytic ruderal forbs become established in the wet areas, and crops usually fail if planted there. The vegetation in these wetlands consists of annual weeds that do not persist through the winter.

Alkaline Wetland

Alkaline wetlands are a type of seasonal wetland influenced by strongly alkaline or saline soils. Alkaline wetlands support alkaline or saline tolerant species such as iodine bush and alkali heath, but may also have large unvegetated areas that are seasonally ponded or saturated.

Nontidal Waters

In the Delta five types of nontidal waters were mapped as the open water portion of either naturally occurring features or unnatural features that were excavated and/or diked. Nontidal waters may occur in depressions of various sizes or in channels with either intermittent or perennially flowing water. The vegetation associated with these waters is discussed separately in the *Perennial Wetlands* and *Seasonal Wetlands* sections. (The types below were designated as either Nontidal Flow or Pond/Lake in the ~~Public~~ Draft EIR/EIS.)

Agricultural Ditches

Throughout the Delta there are many ditches constructed for the purpose of irrigating and/or draining agricultural land. The mapped ditches range in size from one to 22 meters wide. They are generally unvegetated with mud bottoms, but may support floating species such as duckweed or water hyacinth.

Natural Channels

Nontidal natural channels exist on the northeast and southwest edges of the Project Area. These include a section of the Cosumnes River and several small channels linking other water features. All of these features flow intermittently. The substrate in natural channels may be mud, or sand, gravel, and cobbles.

Depressions

Depressions are ponds that are permanently, seasonally, or artificially wet, with little to no rooted vegetation on a mud or sand bottom. They may be artificially filled or result from a high water table. Depressions are less than 20 acres in size with a depth of less than 2 meters. These water bodies are often created in grazing lands for use as stock ponds, and may be diked or otherwise artificially impounded.

Lakes

Lakes have characteristics similar to depressions, but are greater than 20 acres in size and may have a wave-formed shoreline.

Tidal Waters

Tidal waters are the open water portions of aquatic features that are influenced by the rise and fall of the tides. Man-made structures such as gates or culverts may restrict tidal influence to various degrees. The vegetation associated with these waters is discussed separately in the *Perennial Wetlands* and *Seasonal Wetlands* sections.

Tidal Channels

Tidal channels may be naturally occurring perennial riverine waterways, though most have been modified with leveed banks and often reinforced with rock revetment. Water velocity and depth fluctuates under tidal influence, and the channel bottom is generally comprised of mud or sand. Tidal channels that have been created by excavation are usually straight rather than sinuous, and usually have heavily diked or reinforced banks. These excavated channels were often created to provide for navigation, water conveyance, material for levees, or to raise the land surface on adjacent property. Tidal channels are largely unvegetated, or may support floating or submerged aquatic vegetation.

Conveyance Channels

Several large rock-lined conveyance channels were mapped in the study area. These constructed water features were mapped along with all other aquatic resources in the Project Area because they may be subject to some tidal effects and therefore may be considered jurisdictional by the Army Corps of EngineersUSACE. (This type was designated as Muted Tidal Flow in the Public Draft EIR/EIS.)

Clifton Court Forebay

Clifton Court Forebay, a constructed reservoir, is a highly modified perennial water body which is semi-enclosed by land, and engineered to be periodically open to tidal influences via a moveable gate structure. The Forebay is characterized by an artificial rock shore (rock revetment) and an aquatic bed of varying depths. The forebay is largely unvegetated, however, emergent perennials such as cattails and tules are found in shallow areas, and submerged aquatics such as Brazilian waterweed are found in areas of moderate depth.

The features of the proposed EIR/EIS alternatives include canals, tunnels intakes, forebays, pumping plants, staging areas, and borrow and spoil areas and are considered to have either permanent or temporary impacts. These features are stored in a geographic feature class within a geodatabase and were used to determine the surface impact for each alternative.

To determine effects resulting from CM1 construction, the GIS layer of potentially jurisdictional wetland and other waters was intersected with the layer of project footprint surface features for each proposed EIR/EIS alternative. The resulting polygons identify the areas of potential impacts on jurisdictional waters. Acreages of each type of impacted wetland were calculated for each alternative and are presented in the wetlands and waters of the United States impact discussions in Section 12.3.3.

The GIS data layer of wetlands and other waters of the U.S. in this process includes all potentially jurisdictional waters, including those waters that may be later determined by USACE to be isolated or otherwise non-jurisdictional. Although some potential wetlands may not have been identified in areas where hydrology is extensively manipulated by agricultural activity, the use of this methodology and the GIS data layer likely results in an overestimation of the wetlands and waters that would be affected and would require permitting. The actual construction footprints are expected to be smaller than design footprints, including the large intake footprints extending into the Sacramento River. Also, the GIS methodology used to assign a footprint to the transmission corridors involved creating a continuous band of effect along the entire alignment rather than attempting to place individual transmission tower footprints along the alignment. Finally, the

1 potential jurisdictional wetlands mapping included a delineation of all agricultural-related ditches
2 and canals; some of these waterways are likely to be determined non-jurisdictional during the
3 permitting process.

4 The habitat protection and restoration activities associated with other BDCP conservation measures
5 (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of the
6 United States in the study area through the course of the BDCP protection and restoration program.
7 Because these conservation measures have not been defined to the level of site-specific footprints, it
8 is not possible to delineate and quantify these effects in detail. Several of the conservation measures
9 (CM2, CM4 and CM5) have been described with theoretical footprints for purposes of the effects
10 analysis contained in Chapter 5 of the BDCP. These theoretical footprints have been used to predict
11 the acres of natural communities that would be affected through loss or conversion, which gives
12 some indication of jurisdictional wetland effects. Any CM2–CM10 effects ascribed to tidal perennial
13 aquatic, tidal brackish emergent, tidal freshwater emergent, other natural seasonal, nontidal
14 freshwater perennial emergent, and nontidal perennial aquatic wetlands natural communities are
15 likely to also be effects on wetlands and other waters of the United States. Effects ascribed to other
16 natural communities and land cover types with small jurisdictional wetland components
17 (valley/foothill riparian, alkali seasonal wetland complex, vernal pool complex, managed wetland,
18 grassland and cultivated lands) are not easily converted to effects on wetlands and other waters of
19 the United States by the use of theoretical footprints. Because of this lack of detail, a programmatic
20 assessment is provided for these other conservation measures. In the programmatic impact analysis,
21 it has been assumed that 100% of the predominantly wetland natural communities mentioned
22 above and 10% of all of the non-wetland natural communities mentioned above would qualify as
23 wetlands or other waters of the United States under the CWA.

24 **Relationship to Waters of the State**

25 As noted in Section 12.2.2.7, waters of the state includes “any surface water or groundwater,
26 including saline waters, within the boundaries of the state”, which is a broader definition than that
27 of waters of the United States (see Section 12.2.1.1 Sections 404 and 40a of the Clean Water Act). As
28 discussed above, DWR’s delineation of waters of the United States includes all potentially
29 jurisdictional waters, including those waters that may be later determined by USACE to be isolated
30 or otherwise non-jurisdictional (e.g., agricultural ditches and canals). Because DWR’s delineation did
31 not exclude any such wetlands and waters, the delineation also represents what would be
32 considered waters of the state within the Plan Area. Therefore, the analyses and conclusions for
33 effects on waters of the United States in Section 12.3.3 under Impact BIO-176: *Effects of Constructing*
34 *Water Conveyance Facilities (CM1) on Wetlands and Other Waters of the United States* and Impact
35 *BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on Wetlands and Other*
36 *Waters of the United States* would also apply to waters of the state.
37

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)

General Terrestrial Biology Effects

Wetlands and Other Waters of the United States

Alternative 1A actions would both permanently and temporarily remove or convert wetlands and open water that ~~is potentially jurisdictional as are~~ regulated by USACE under Section 404 of the CWA. The 404 regulations and relevant information on mitigation the effects of impact to wetlands and waters of the United States (U.S.) are described in Section 12.2.1.1 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS. The following two impacts address the project-level effects of CM1 on these potential wetlands and waters, and the programmatic-level effects of other relevant conservation actions (CM2–CM10). CM11–~~CM22–CM21~~ would not directly result in loss or conversion of wetlands or other waters of the ~~United States~~U.S. The methods used to conduct these analyses are described in Section 12.3.2.4 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS. The waters of the U.S. data used for this analysis is based on a verified wetland delineation from the USACE that was completed in early 2015. These waters of the U.S. were mapped at finer scale than that which was done for the natural community mapping for the BDCP and therefor the acreages of these two datasets differ when compared to each other. The waters of the U.S. mapping identified numerous agricultural ditches and seasonal wetlands occurring within and associated with cultivated lands, which explains the majority of the difference.~~of this chapter.~~

Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and Other Waters of the United States

Alternative 1A proposes the construction, maintenance, and operation of water conveyance facilities within, or requiring the unavoidable fill of, waters of the U.S. The estimated fill of jurisdictional waters associated with this alternative is described in Table 12-1A-69 below. Construction of the Alternative 1A water conveyance facilities would both temporarily and permanently remove potential wetlands and other waters of the United States as regulated by Section 404 of the CWA (Table 12-1A-69). Based on the methodology used to conduct this analysis, the losses would occur at intake, tunnel, pipeline, canal, and RTM and borrow/spoil storage sites, transmission corridors, and multiple temporary work areas associated with the construction activity. The permanent open water and wetland losses (~~188 acres~~) would occur at various locations along the pipeline/tunnel alignment, but the majority would occur due to construction of Alternative 1A's five intake structures along the eastern bank of the Sacramento River between Freeport and Courtland in the north Delta (including associated spoil/borrow areas), construction of forebays in both the north and south Delta areas, and the RTM storage sites associated with tunnel construction at various locations, including on Andrus, Tyler, Venice and Bacon Islands. However, through implementation of an environmental commitment to reuse RTM or dispose of it at appropriate facilities, as described in Appendix 3B, *Environmental Commitments* of the Draft EIR/EIS, it is anticipated that the material would be removed from these areas and applied, as appropriate, as bulking material for levee maintenance or as fill material for habitat restoration projects, or would be put to other beneficial means of reuse identified for the material. The temporary open water and wetland effects (~~164 acres~~) would also occur mainly at the five intake construction sites along the eastern bank of the Sacramento River, and at barge unloading facilities in the San Joaquin and Middle Rivers.

1 **Table 12-1A-69. Estimated Fill of Waters of the U.S. Associated with the Construction of Water**
 2 **Conveyance Facilities under Alternative 1A (acres) ~~Potential Wetlands and Other Waters of the United~~**
 3 **States Filled by Construction of Alternative 1A Water Conveyance Facilities (acres)**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as		Total Impact
		Permanent ¹	Temporary Impact	
<u>Agricultural Ditch</u>	<u>64.9</u>	<u>23.4</u>	<u>0</u>	<u>88.4</u>
<u>Alkaline Wetland</u>	<u>0.10</u>	<u>0</u>	<u>0</u>	<u>0.1</u>
<u>Clifton Court Forebay</u>	<u>1.0</u>	<u>0</u>	<u>0</u>	<u>1.0</u>
<u>Conveyance Channel</u>	<u>12.7</u>	<u>1.1</u>	<u>0</u>	<u>13.8</u>
<u>Depression</u>	<u>1.9</u>	<u>1.8</u>	<u>0</u>	<u>3.7</u>
<u>Emergent Wetland</u>	<u>46.8</u>	<u>7.3</u>	<u>0</u>	<u>54.0</u>
<u>Forest</u>	<u>5.8</u>	<u>11.9</u>	<u>0</u>	<u>17.7</u>
<u>Lake</u>	<u>0</u>	<u>0.3</u>	<u>0</u>	<u>0.3</u>
<u>Scrub-Shrub</u>	<u>20.6</u>	<u>4.3</u>	<u>0</u>	<u>24.9</u>
<u>Seasonal Wetland</u>	<u>18.7</u>	<u>26.6</u>	<u>0</u>	<u>45.4</u>
<u>Tidal Channel</u>	<u>42.9</u>	<u>133.8</u>	<u>0</u>	<u>176.7</u>
<u>Vernal Pool</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	215	211	0	426

4

Wetland/Other Water Type ^a	Permanent ^b	Temporary	Total
Open Water			
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
Wetland			
Nontidal Wetland	67	9	76
Tidal Wetland	5	4	9
Seasonal Wetland	<1	3	4
Total Impact Acres	188	164	352

^a Wetland types are described in the methods section of this chapter (Section 12.3.2.4).

^b Effects include fill from construction of 10-foot high RTM storage sites.

Source: California Department of Water Resources 2013b

5

6 The majority of the impacts on wetlands and waters of U.S. are on tidal channels, emergent
 7 wetlands, and on wetlands and waters found within cultivated lands (agricultural ditches and
 8 seasonal wetlands). These impacts mostly result from the construction of the barge unloading
 9 facilities, intake work areas, shaft locations, and transmission lines. The impacted seasonal wetlands

¹ Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

1 mapped within the Conveyance Planning Area, as described in Section 12.3.2.4 in Appendix A, Draft
2 EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS, all occur in the central Delta within plowed
3 agricultural fields.

4 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
5 functions due to construction activities are fully compensated. Wetland functions are defined as a
6 process or series of processes that take place within a wetland. These include the storage of water,
7 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
8 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
9 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
10 do they perform all functions equally well. The location and size of a wetland may determine what
11 functions it will perform. For example, the geographic location may determine its habitat functions,
12 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
13 quality functions. Many factors determine how well a wetland will perform these functions: climatic
14 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
15 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
16 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
17 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
18 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
19 ground and nursery for numerous species. Many endangered plant and animal species are
20 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
21 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
22 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
23 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
24 include the trapping of sediment, pollution control, and the biochemical processes that take place as
25 water enters, is stored in, or leaves a wetland.

26 The functions of the waters of the U.S. that will be temporarily or permanently impacted by this
27 alternative vary greatly depending primarily on existing land uses and historical levels of
28 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
29 maintained and often devoid of vegetation, support only minimal hydraulic function (water
30 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
31 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
32 quality functions (e.g. reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
33 channels affected by this alternative support functions in all three categories, but the level at which
34 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
35 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
36 disturbance due to past land uses. Although these features likely support habitat, water quality, and
37 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
38 depending on the overall ecological setting and level of disturbance. Functions associated with
39 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
40 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
41 waterway, these features are expected to function at a high level. However, where these habitats
42 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
43 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
44 such, their habitat functions have been greatly compromised, but they retain some water quality and
45 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
46 areas; however the depressions may support wetland vegetation at their edges. The areas mapped

1 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
2 relatively small, each lake is likely performing functions from all three categories.

3 A functional assessment of wetlands proposed for fill will be conducted during the development of
4 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
5 assessment will be compared to the expected functions at the proposed mitigation site(s) such that
6 it can be confirmed that the compensatory mitigation will in fact accomplish full functional
7 replacement of impacted wetlands. All impacted wetlands will be replaced with fully functional
8 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
9 hydrologic/hydraulic function. Since many impacted wetlands will be significantly less than high
10 function, the compensatory mitigation will result in a net increase in wetland function.

11 Alternative 1A was designed to avoid waters of the U.S. to the maximum extent practicable. Each of
12 the conveyance components has been located in upland areas where it was feasible to do so. Once
13 construction begins, specific measures will be implemented, as described in the AMMs set out in
14 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP and in Appendix D,
15 Substantive BDCP Revisions, of this RDEIR/SDEIS (AMM6), to further avoid and minimize effects to
16 waters of the U.S. as well as to special-status species. The AMMs will be implemented at all phases of
17 a project, from siting through design, construction, and on to operations and maintenance. The
18 AMMs that pertain specifically to waters of the U.S. are 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, AMM10 Restoration of Temporarily Affected Natural
23 Communities, AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and Alignment
24 Guidelines, AMM34 Construction Site Security, and AMM36 Notification of Activities in Waterways.

25 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
26 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
27 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, will also
28 result in further avoidance and minimization of effects to waters of the United States.

29 Aside from wetland habitats that would be created as a result of implementing CMs 4-10, some of
30 which could serve the dual purpose of offsetting effects to species and mitigating impacts on waters
31 of the U.S., more specific mitigation is required to ensure that there is no net loss of wetland
32 functions and values as a result of implementing Alternative 1A pursuant to USACE's and U.S. EPA's
33 Mitigation Rule (see Section 12.2.1.1 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions of this
34 RDEIR/SDEIS). Mitigation Measure BIO-176, Compensatory Mitigation for Fill of Waters of the U.S.
35 would be available to address adverse impacts on waters of the U.S.

36 **NEPA Effects:** The permanent and temporary loss of these ~~potential~~ jurisdictional wetlands and
37 waters as a result of constructing Alternative 1A water conveyance facilities would be a substantial
38 effect if not compensated by wetland protection and/or restoration. This loss would represent a
39 removal of federally protected wetlands as defined by Section 404 of the CWA. ~~However, Alternative~~
40 ~~1A includes conservation measures (CM4 and CM10) that would restore and protect large acreages~~
41 ~~of both tidal and nontidal wetlands and open water in the study area. Through the course of the~~
42 ~~BDCP restoration program, this alternative would restore 65,000 acres of tidal and 1,200 acres of~~
43 ~~nontidal wetland or open water.~~ Impacts on wetlands from CM1 construction would occur in the
44 first 10 years after BDCP approval. The Plan under Alternative 1A would also implement AMMs 1-7,

1 10, 12, 30, 34, and 36, which would avoid and minimize fill of wetlands and waters and any indirect
2 effects to wetlands and waters. Approximately 19,550 acres of this wetland restoration would occur
3 during this time period, thereby offsetting the impacts of CM1 construction. However, specific
4 mitigation would be required to ensure that Alternative 1A does not result in a loss of functions and
5 values of waters of the U.S. and thus that the affect is not adverse. Mitigation Measure BIO-176,
6 Compensatory Mitigation for Fill of Waters of the U.S., would be available to reduce these effects such
7 that they are not adverse. These acreages greatly exceed the no net loss (1:1 replacement ratio)
8 requirement for Alternative 1A (352 acres). Therefore, there would be an overall beneficial effect on
9 potential jurisdictional wetlands and other waters of the United States from BDCP implementation.

10 **CEQA Conclusion:** The permanent and temporary loss of these jurisdictional wetlands and waters of
11 the U.S. as a result of constructing Alternative 1A water conveyance facilities would be a significant
12 impact. Specific mitigation would be required to ensure that Alternative 1A does not result in a loss
13 of functions and values of waters of the U.S. Mitigation Measure BIO-176, Compensatory Mitigation
14 for Fill of Waters of the U.S., would be available to reduce the impact to a less-than-significant level.
15 Alternative 1A does propose to restore up to 76,721 acres of wetland natural communities under
16 the Plan, which would include 65,000 acres of tidal marsh restoration (CM4), 10,000 acres of
17 seasonally inundated floodplain restoration (CM5), 21 acres of vernal pool/alkali seasonal wetlands
18 (CM9; 67 acres of vernal pool complex and 72 acres of alkali seasonal wetland complex assuming a
19 wetland density of 15%), and 1,700 acres of nontidal marsh restoration (CM10). In addition,
20 Alternative 1A would restore 5,000 acres of riparian habitat (CM7), some portion of which may also
21 qualify as forested or scrub-shrub wetland. In addition, 20 miles of levees will have channel margin
22 enhancement conducted on them (CM6), which would include improving channel geometry and
23 restoring riparian, marsh, and mudflat habitats on the water side of levees.

24 The success in implementing these Conservation Measures would be assured through effectiveness
25 monitoring, which includes success criteria, and adaptive management as outlined in the Adaptive
26 Management and Monitoring sections of the Draft BDCP for tidal marsh restoration (Draft BDCP
27 Section 3.4.4.4), seasonal floodplain restoration (Draft BDCP Section 3.4.5.4), channel margin
28 enhancement (Draft BDCP Section 3.4.6.4), valley/foothill riparian restoration (Draft BDCP Section
29 3.4.7.4), vernal pool and alkali seasonal wetland complex restoration (Draft BDCP Section 3.4.9.4),
30 and nontidal marsh restoration (Draft BDCP Section 3.4.10.3). All restored areas will be secured in
31 fee-title or through conservation easements.

32 Alternative 1A would also result in the protection and management of the following natural
33 communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool
34 complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50
35 acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands
36 will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and
37 agricultural ditches.

38 The Plan under Alternative 1A would also implement AMMs 1-7, 10, 12, 30, 34, and 36, which would
39 avoid and minimize fill of waters of the U.S. and any indirect effects to wetlands and waters. As
40 stated above, specific mitigation would be required to ensure that Alternative 1A does not result in a
41 loss of functions and values of waters of the U.S. Mitigation Measure BIO-176, Compensatory
42 Mitigation for Fill of Waters of the U.S., would be available to reduce the impact to a less-than-
43 significant level.

1 The permanent and temporary loss of potential jurisdictional wetlands as a result of constructing
2 Alternative 1A water conveyance facilities would be a substantial impact if not compensated for by
3 wetland protection and/or restoration. This loss would represent either temporary or permanent
4 removal of federally protected wetlands or other waters of the United States as defined by Section
5 404 of the CWA. However, Alternative 1A includes conservation measures (CM4 and CM10) that
6 would restore and protect large acreages of both tidal and nontidal wetlands and open water.
7 Through the course of the BDCP restoration program, this alternative would result in restoration of
8 65,000 acres of tidal and 1,200 acres of nontidal wetlands and open water. Impacts on wetlands
9 from CM1 construction would occur in the first 10 years after BDCP approval. Approximately 19,550
10 acres of this wetland restoration would occur during this time period, thereby offsetting the impacts
11 of CM1 construction. These acreages greatly exceed the no net loss (1:1 replacement ratio)
12 requirement for Alternative 1A (352 acres). Therefore, there would be a beneficial impact on
13 potential jurisdictional wetlands and other waters of the United States from BDCP implementation.

14 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.**

15 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
16 success monitoring, long-term preservation, and long-term maintenance and monitoring
17 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
18 replace lost function through the mechanisms discussed below which will result in restoration
19 and/or creation of habitat with at least as much function and value as those of the impacted
20 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
21 than that of impacted habitat.

22 Compensation ratios are driven by type, condition, and location of replacement habitat as
23 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
24 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
25 accept preservation as the only form of mitigation; use of preservation as mitigation typically
26 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
27 minimum of 1:1, depending on the factors listed above.

28 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
29 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
30 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
31 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
32 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
33 combination of the following methods:

- 34 ● Purchase credits for restored/created/rehabilitated habitat at an approved wetland
35 mitigation bank;
- 36 ● On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
37 converted to uplands due to past land use activities (such as agriculture) or functionally
38 degraded by such activities;
- 39 ● On-site (adjacent to the project footprint) creation of aquatic habitat;
- 40 ● Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
41 due to past land use activities (such as agriculture) or functionally degraded by such
42 activities;
- 43 ● Off-site (within the Delta) creation of aquatic habitat; and/or

1 • Payment into the Corps' Fee-in-Lieu program.

2 Purchase of Credits or Payment into Fee-in-Lieu Program

3 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
4 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
5 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
6 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
7 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
8 these categories.

9 On-Site Restoration, Rehabilitation and/or Creation

10 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
11 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
12 could occur immediately adjacent to the project footprint. It is anticipated that some of the
13 compensatory mitigation will fall into this category.

14 Off-Site Restoration, Rehabilitation and/or Creation

15 There exists, within the immediate vicinity of the project area, Delta land which has been subject
16 to agricultural practices or other land uses which have degraded or even converted wetlands
17 that existed historically. Sites within the Delta will be evaluated for their restoration,
18 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
19 mitigation will fall into this category.

20 Compensatory mitigation will result in no net loss of acreage of Waters of the U.S. and will
21 accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
22 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
23 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
24 at significantly less than high levels, the compensatory mitigation will result in a significant net
25 increase in wetland function.

26 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**
27 **Wetlands and Other Waters of the United States**

28 The habitat protection and restoration activities associated with Alternative 1A's other conservation
29 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of
30 the United States U.S. in the study area over the course of BDCP conservation action implementation.
31 Because these conservation measures have not been defined to the level of site-specific footprints, it
32 is not possible to delineate and quantify these effects in detail. Several of the conservation measures
33 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects
34 analysis contained in Chapter 5- Effects Analysis, of the Draft BDCP of the BDCP.

35 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
36 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
37 from CM2-CM10 were analyzed by looking at effects on wetland natural communities mapped
38 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
39 predominantly wetland natural communities listed in Appendix 12E found in Appendix A, Draft
40 EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS and that 10% of all of the non-wetland
41 natural communities listed in that table would qualify as wetlands or other waters of the United

1 States under the CWA. Based on this approach approximately 19,850 acres of potentially
2 jurisdictional wetlands and waters could be affected by CM2-CM10. The majority of these impacts
3 are attributable to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4,
4 which would likely result in an improvement of wetland function in the Plan Area.

5 ~~These theoretical footprints have been used to predict the acres of natural communities that would~~
6 ~~be affected through loss or conversion, which gives some indication of jurisdictional wetland effects.~~
7 ~~Any CM2–CM10 effects ascribed to tidal perennial aquatic, tidal brackish emergent, tidal freshwater~~
8 ~~emergent, other natural seasonal, nontidal freshwater perennial emergent, and nontidal perennial~~
9 ~~aquatic wetlands natural communities are likely to also be effects on wetlands and other waters of~~
10 ~~the United States. Effects ascribed to other natural communities and land cover types with small~~
11 ~~jurisdictional wetland components (valley/foothill riparian, alkali seasonal wetland complex, vernal~~
12 ~~pool complex, managed wetland, grassland and cultivated land) are not easily converted to effects~~
13 ~~on wetlands and other waters of the United States by the use of theoretical footprints. Because of~~
14 ~~this lack of detail, a programmatic assessment is provided for these other conservation measures.~~

15 **NEPA Effects:** ~~The conversion of existing wetland natural communities to other types of wetland~~
16 ~~natural communities through implementation of CM2–CM10 for Alternative 1A would be in the~~
17 ~~range of 5,500 to 6,000 acres approximately 19,850 acres, assuming that 100% of the predominantly~~
18 ~~wetland natural communities listed in Table 12-1A-69 and that 10% of all of the non-wetland~~
19 ~~natural communities listed in that table would qualify as wetlands or other waters of the United~~
20 ~~States under the CWA. Most of these wetlands would be converted to tidal and nontidal wetlands~~
21 ~~and open water through implementation of CM4, and CM10. Although the increase in wetland~~
22 ~~acreage and wetland functions from these restoration actions could in part offset the effects on~~
23 ~~waters of the U.S. occurring in these areas, implementation of Mitigation Measure BIO-176,~~
24 ~~Compensatory Mitigation for Fill of Waters of the U.S., would be required to ensure that these effects~~
25 ~~are not adverse. The wetlands and open water created by these two restoration actions would be~~
26 ~~approximately 66,200 acres, far exceeding what is required under the no net loss policy used by the~~
27 ~~USACE in considering Section 404 permits, even if one were to assume that all conversions~~
28 ~~represented a functional wetland loss. Therefore, there would be a beneficial effect on potential~~
29 ~~jurisdictional wetlands and other waters of the United States from implementing CM2–CM10.~~

30 **CEQA Conclusion:** ~~The conversion of existing wetland natural communities to other types of~~
31 ~~wetland natural communities through implementation of CM2–CM10 for Alternative 1A would be~~
32 ~~approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open~~
33 ~~water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities~~
34 ~~would be restored under Alternative 1A. Although the increase in wetland acreage and wetland~~
35 ~~functions from this restoration could in part offset the effects on waters of the U.S. occurring in these~~
36 ~~areas, implementation of Mitigation Measure BIO-176, Compensatory Mitigation for Fill of Waters of~~
37 ~~the U.S., would be required to ensure that the impacts are reduced to a less-than-significant level. The~~
38 ~~permanent and temporary loss of potential jurisdictional wetlands as a result of implementing the~~
39 ~~other conservation measures (CM2–CM10) of Alternative 1A would be a substantial effect if not~~
40 ~~compensated for by wetland protection and/or restoration. This loss would represent a removal of~~
41 ~~federally protected wetlands or other waters of the United States as defined by Section 404 of the~~
42 ~~CWA. However, Alternative 1A includes conservation measures (CM4 and CM10) that would restore~~
43 ~~large acreages of both tidal and nontidal wetlands and open water in the study area. Over the life of~~
44 ~~the BDCP restoration program, this alternative would result in restoration of 66,200 acres of tidal~~
45 ~~and nontidal wetlands and open water, of which 19,550 acres would be restored in the first 10~~
46 ~~years. These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for~~

- 1 ~~Alternative 1A (5,500–6,000 acres). Therefore, there would be a beneficial impact on potential~~
- 2 ~~jurisdictional wetlands and other waters of the United States from implementing CM2–CM10.~~

12.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)

General Terrestrial Biology Effects

Wetlands and Other Waters of the United States

Alternative 1B actions would both permanently and temporarily remove or convert wetlands and open water that ~~is potentially jurisdictional as are~~ regulated by the USACE under Section 404 of the CWA. The 404 regulations and relevant information on mitigation the effects of impact to wetlands and waters of the United States (U.S.) are described in Section 12.2.1.1 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS. The following two impacts address the project-level effects of CM1 on these potential wetlands and waters, and the programmatic-level effects of other relevant conservation actions (CM2–CM10). CM11–~~CM22-CM21~~ would not directly result in loss or conversion of wetlands or other waters of the ~~United States~~U.S. The methods used to conduct these analyses are described in Section 12.3.2.4 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS. The waters of the U.S. data used for this analysis is based on a verified wetland delineation from the USACE that was completed in early 2015. These waters of the U.S. were mapped at finer scale than that which was done for the natural community mapping for the BDCP and therefor the acreages of these two datasets differ when compared to each other. The waters of the U.S. mapping identified numerous agricultural ditches and seasonal wetlands occurring within and associated with cultivated lands, which explains the majority of the difference.~~of this chapter.~~

Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and Other Waters of the United States

Alternative 1B proposes the construction, maintenance, and operation of water conveyance facilities within, or requiring the unavoidable fill of, waters of the U.S. The estimated fill of jurisdictional waters associated with this alternative is described in Table 12-1B-69 below. Construction of the Alternative 1B water conveyance facilities would both temporarily and permanently remove potential wetlands and other waters of the United States as regulated by Section 404 of the CWA (Table 12-1B-69). Based on the methodology used to conduct this analysis, the losses would occur at pipeline, canal and intake areas, borrow/spoil storage sites, transmission corridors, forebay site, and multiple temporary work areas associated with the construction activity. The permanent open water and wetland losses (~~346 acres~~) would occur at scattered locations along the water conveyance facility alignment, with the majority caused by construction of Alternative 1B's five intake structures along the eastern bank of the Sacramento River between Freeport and Courtland in the north Delta (including associated spoil/borrow areas), along the entire canal route in the east Delta, and at the Byron forebay site in the south Delta. The temporary open water and wetland effects (~~206 acres~~) would also occur mainly at the five intake construction sites along the eastern bank of the Sacramento River, and at temporary siphon work areas where the canal crosses under eastern Delta sloughs and waterways.

1 **Table 12-1B-69. Estimated Fill of Waters of the U.S. Associated with the Construction of Water**
 2 **Conveyance Facilities under Alternative 1B (acres) Loss of Potential Wetlands and Other Waters of the**
 3 **United States from Construction of Alternative 1B Water Conveyance Facilities**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as		Total Impact
		Permanent ¹	Temporary Impact	
Agricultural Ditch	228.0	31.1	0	259.1
Alkaline Wetland	0.1	0	0	0.1
Clifton Court Forebay	1.0	0	0	1.0
Conveyance Channel	12.7	1.1	0	13.8
Depression	35.1	1.9	0	37.0
Emergent Wetland	77.6	20.0	0	97.6
Forest	9.3	6.9	0	16.2
Lake	0.2	0.3	0	0.5
Scrub-Shrub	13.8	12.2	0	26.0
Seasonal Wetland	177.5	0	0	177.5
Tidal Channel	28.1	146.3	0	174.3
Vernal Pool	0	0	0	0
Total	583	220	0	803

4

Wetland/Other Water Type ^a	Permanent	Temporary	Total
Open Water			
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
Wetland			
Nontidal Wetland	42	11	53
Tidal Wetland	5	25	30
Seasonal Wetland	<1	0	<1
Total Impact Acres	346	206	552

^a Wetland types are described in the methods section of this chapter (Section 12.3.2.4).
Source: California Department of Water Resources 2013.

5 The majority of the impacts on wetlands and waters of U.S. are to wetlands found within cultivated
 6 lands (mostly agricultural ditches and seasonal wetlands), tidal channel, and emergent wetlands.
 7 These impacts mostly result from reusable tunnel material areas, canal construction, and siphon
 8 work areas. The impacted seasonal wetlands mapped within the Conveyance Planning Area, as
 9 described in Section 12.3.2.4 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this
 10 RDEIR/SDEIS, all occur in the central Delta within plowed agricultural fields.

¹ Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

1 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
2 functions due to construction activities are fully compensated. Wetland functions are defined as a
3 process or series of processes that take place within a wetland. These include the storage of water,
4 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
5 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
6 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
7 do they perform all functions equally well. The location and size of a wetland may determine what
8 functions it will perform. For example, the geographic location may determine its habitat functions,
9 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
10 quality functions. Many factors determine how well a wetland will perform these functions: climatic
11 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
12 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
13 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
14 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
15 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
16 ground and nursery for numerous species. Many endangered plant and animal species are
17 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
18 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
19 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
20 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
21 include the trapping of sediment, pollution control, and the biochemical processes that take place as
22 water enters, is stored in, or leaves a wetland.

23 The functions of the waters of the U.S. that will be temporarily or permanently impacted by this
24 alternative vary greatly depending primarily on existing land uses and historical levels of
25 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
26 maintained and often devoid of vegetation, support only minimal hydraulic function (water
27 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
28 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
29 quality functions (e.g. reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
30 channels affected by this alternative support functions in all three categories, but the level at which
31 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
32 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
33 disturbance due to past land uses. Although these features likely support habitat, water quality, and
34 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
35 depending on the overall ecological setting and level of disturbance. Functions associated with
36 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
37 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
38 waterway, these features are expected to function at a high level. However, where these habitats
39 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
40 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
41 such, their habitat functions have been greatly compromised, but they retain some water quality and
42 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
43 areas; however the depressions may support wetland vegetation at their edges. The areas mapped
44 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
45 relatively small, each lake is likely performing functions from all three categories.

1 A functional assessment of wetlands proposed for fill will be conducted during the development of
2 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
3 assessment will be compared to the expected functions at the proposed mitigation site(s) such that
4 it can be confirmed that the compensatory mitigation will in fact accomplish full functional
5 replacement of impacted wetlands. All impacted wetlands will be replaced with fully functional
6 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
7 hydrologic/hydraulic function. Since many impacted wetlands will be significantly less than high
8 function, the compensatory mitigation will result in a net increase in wetland function.

9 Alternative 1B was designed to avoid waters of the U.S. to the maximum extent practicable. Each of
10 the conveyance components has been located in upland areas where it was feasible to do so. Once
11 construction begins, specific measures will be implemented, as described in the AMMs set out in
12 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP and in Appendix D,
13 Substantive BDCP Revisions, of this RDEIR/SDEIS (AMM6), to further avoid and minimize effects to
14 waters of the U.S. as well as to special-status species. The AMMs will be implemented at all phases of
15 a project, from siting through design, construction, and on to operations and maintenance. The
16 AMMs that pertain specifically to waters of the U.S. are 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, AMM10 Restoration of Temporarily Affected Natural
21 Communities, AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and Alignment
22 Guidelines, AMM34 Construction Site Security, and AMM36 Notification of Activities in Waterways.

23 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
24 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
25 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, will also
26 result in further avoidance and minimization of effects to waters of the United States.

27 Aside from wetland habitats that would be created as a result of implementing CMs 4-10, some of
28 which could serve the dual purpose of offsetting effects to species and mitigating impacts on waters
29 of the U.S., more specific mitigation is required to ensure that there is no net loss of wetland
30 functions and values as a result of implementing Alternative 1B pursuant to USACE's and U.S. EPA's
31 Mitigation Rule (see Section 12.2.1.1 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions of this
32 RDEIR/SDEIS). Mitigation Measure BIO-176, Compensatory Mitigation for Fill of Waters of the U.S.
33 would be available to address adverse impacts on waters of the U.S.

34 **NEPA Effects:** The permanent and temporary loss of these ~~potential~~ jurisdictional wetlands and
35 waters as a result of constructing Alternative 1B water conveyance facilities would be a substantial
36 effect if not compensated by wetland protection and/or restoration. This loss would represent a
37 removal of federally protected wetlands as defined by Section 404 of the CWA. ~~However, Alternative~~
38 ~~1B includes conservation measures (CM4 and CM10) that would restore and protect large acreages~~
39 ~~of both tidal and nontidal wetlands and open water in the study area.~~

40 ~~Through the course of the BDCP restoration program, Alternative 1B would restore 65,000 acres of~~
41 ~~tidal and 1,200 acres of nontidal wetland or open water. The Plan under Alternative 1B would also~~
42 ~~implement AMMs 1-7, 10, 12, 30, 34, and 36, which would avoid and minimize fill of wetlands and~~
43 ~~waters and any indirect effects to wetlands and waters. Impacts on wetlands from CM1 construction~~
44 ~~would occur in the first 10 years after BDCP approval. Approximately 19,550 acres of this wetland~~

1 ~~restoration would occur during this time period, thereby offsetting the impacts of CM1 construction.~~
2 ~~Specific mitigation would be required to ensure that Alternative 1B does not result in a loss of~~
3 ~~functions and values of waters of the U.S. and thus that the affect is not adverse. Mitigation Measure~~
4 ~~BIO-176, *Compensatory Mitigation for Fill of Waters of the U.S.*, would be available to reduce these~~
5 ~~effects such that they are not adverse. These acreages greatly exceed the no net loss (1:1~~
6 ~~replacement ratio) requirement for Alternative 1B (552 acres). Therefore, there would be an overall~~
7 ~~beneficial effect on potential jurisdictional wetlands and other waters of the United States from~~
8 ~~BDCP implementation.~~

9 **CEQA Conclusion:** ~~The permanent and temporary loss of these jurisdictional wetlands and waters of~~
10 ~~the U.S. as a result of constructing Alternative 1B water conveyance facilities would be a significant~~
11 ~~impact. Specific mitigation would be required to ensure that Alternative 1B does not result in a loss~~
12 ~~of functions and values of waters of the U.S. Mitigation Measure BIO-176, *Compensatory Mitigation*~~
13 ~~*for Fill of Waters of the U.S.*, would be available to reduce the impact to a less-than-significant level.~~
14 ~~Alternative 1B does propose to restore up to 76,721 acres of wetland natural communities under~~
15 ~~the Plan, which would include 65,000 acres of tidal marsh restoration (CM4), 10,000 acres of~~
16 ~~seasonally inundated floodplain restoration (CM5), 21 acres of vernal pool/alkali seasonal wetlands~~
17 ~~(CM9; 67 acres of vernal pool complex and 72 acres of alkali seasonal wetland complex assuming a~~
18 ~~wetland density of 15%), and 1,700 acres of nontidal marsh restoration (CM10). In addition,~~
19 ~~Alternative 1B would restore 5,000 acres of riparian habitat (CM7), some portion of which may also~~
20 ~~qualify as forested or scrub-shrub wetland. In addition, 20 miles of levees will have channel margin~~
21 ~~enhancement conducted on them (CM6), which would include improving channel geometry and~~
22 ~~restoring riparian, marsh, and mudflat habitats on the water side of levees. Impacts on wetlands~~
23 ~~from CM1 construction would occur in the first 10 years after BDCP approval. Approximately 20,065~~
24 ~~acres of this wetland restoration would occur during this time period~~

25 ~~The success in implementing these Conservation Measures would be assured through effectiveness~~
26 ~~monitoring, which includes success criteria, and adaptive management as outlined in the *Adaptive*~~
27 ~~*Management and Monitoring* sections of the Draft BDCP for tidal marsh restoration (Draft BDCP~~
28 ~~Section 3.4.4.4), seasonal floodplain restoration (Draft BDCP Section 3.4.5.4), channel margin~~
29 ~~enhancement (Draft BDCP Section 3.4.6.4), valley/foothill riparian restoration (Draft BDCP Section~~
30 ~~3.4.7.4), vernal pool and alkali seasonal wetland complex restoration (Draft BDCP Section 3.4.9.4),~~
31 ~~and nontidal marsh restoration (Draft BDCP Section 3.4.10.3). All restored areas will be secured in~~
32 ~~fee-title or through conservation easements.~~

33 ~~Alternative 1B would also result in the protection and management of the following natural~~
34 ~~communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool~~
35 ~~complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50~~
36 ~~acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands~~
37 ~~will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and~~
38 ~~agricultural ditches.~~

39 ~~The Plan under Alternative 1B would also implement AMMs 1-7, 10, 12, 30, 34, and 36, which would~~
40 ~~avoid and minimize fill of waters of the U.S. and any indirect effects to wetlands and waters.. As~~
41 ~~stated above, specific mitigation would be required to ensure that Alternative 1B does not result in a~~
42 ~~loss of functions and values of waters of the U.S. Mitigation Measure BIO-176, *Compensatory*~~
43 ~~*Mitigation for Fill of Waters of the U.S.*, would be available to reduce the impact to a less-than-~~
44 ~~significant level.~~

1 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.**

2 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
3 success monitoring, long-term preservation, and long-term maintenance and monitoring
4 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
5 replace lost function through the mechanisms discussed below which will result in restoration
6 and/or creation of habitat with at least as much function and value as those of the impacted
7 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
8 than that of impacted habitat.

9 Compensation ratios are driven by type, condition, and location of replacement habitat as
10 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
11 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
12 accept preservation as the only form of mitigation; use of preservation as mitigation typically
13 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
14 minimum of 1:1, depending on the factors listed above.

15 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
16 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
17 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
18 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
19 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
20 combination of the following methods:

- 21 ● Purchase credits for restored/created/rehabilitated habitat at an approved wetland
22 mitigation bank;
- 23 ● On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
24 converted to uplands due to past land use activities (such as agriculture) or functionally
25 degraded by such activities;
- 26 ● On-site (adjacent to the project footprint) creation of aquatic habitat;
- 27 ● Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
28 due to past land use activities (such as agriculture) or functionally degraded by such
29 activities;
- 30 ● Off-site (within the Delta) creation of aquatic habitat; and/or
- 31 ● Payment into the Corps' Fee-in-Lieu program.

32 *Purchase of Credits or Payment into Fee-in-Lieu Program*

33 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
34 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
35 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
36 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
37 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
38 these categories.

1 On-Site Restoration, Rehabilitation and/or Creation

2 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
3 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
4 could occur immediately adjacent to the project footprint. It is anticipated that some of the
5 compensatory mitigation will fall into this category.

6 Off-Site Restoration, Rehabilitation and/or Creation

7 There exists, within the immediate vicinity of the project area, Delta land which has been subject
8 to agricultural practices or other land uses which have degraded or even converted wetlands
9 that existed historically. Sites within the Delta will be evaluated for their restoration,
10 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
11 mitigation will fall into this category.

12 Compensatory mitigation will result in no net loss of acreage of Waters of the U.S. and will
13 accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
14 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
15 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
16 at significantly less than high levels, the compensatory mitigation will result in a significant net
17 increase in wetland function.

18 ~~The permanent and temporary loss of potential jurisdictional wetlands as a result of constructing~~
19 ~~Alternative 1B water conveyance facilities would be a substantial effect if not compensated for by~~
20 ~~wetland protection and/or restoration. This loss would represent either temporary or permanent~~
21 ~~removal of federally protected wetlands or other waters of the United States as defined by Section~~
22 ~~404 of the CWA. However, Alternative 1B includes conservation measures (CM4 and CM10) that~~
23 ~~would restore and protect large acreages of both tidal and nontidal wetlands and open water.~~
24 ~~Through the course of the BDCP restoration program, this alternative would result in restoration of~~
25 ~~65,000 acres of tidal and 1,200 acres of nontidal wetlands and open water. Impacts on wetlands~~
26 ~~from CM1 construction would occur in the first 10 years after BDCP approval. Approximately 19,550~~
27 ~~acres of this wetland restoration would occur during this time period, thereby offsetting the impacts~~
28 ~~of CM1 construction. These acreages greatly exceed the no net loss (1:1 replacement ratio)~~
29 ~~requirement for Alternative 1B (552 acres). Therefore, there would be a beneficial impact on~~
30 ~~potential jurisdictional wetlands and other waters of the United States from BDCP implementation.~~

31 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**
32 **Wetlands and Other Waters of the United States**

33 The habitat protection and restoration activities associated with Alternative 1B's other conservation
34 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and ~~w~~Waters
35 of the ~~US-U.S.~~ in the study area over the course of BDCP conservation action implementation.
36 Because these conservation measures have not been defined to the level of site-specific footprints, it
37 is not possible to delineate and quantify these effects in detail. Several of the conservation measures
38 (CM2, CM4 and CM5) have been described with theoretical footprints for purposes of the effects
39 analysis contained in Chapter 5, ~~Effects Analysis, of the Draft BDCP~~ ~~of the BDCP~~.

40 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
41 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
42 from CM2-CM10 were analyzed by looking at effects on wetland natural communities mapped

1 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
 2 predominantly wetland natural communities listed in Appendix 12E found in Appendix A, Draft
 3 EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS and that 10% of all of the non-wetland
 4 natural communities listed in that table would qualify as wetlands or other waters of the United
 5 States under the CWA. Based on this approach approximately 19,850 acres of potentially
 6 jurisdictional wetlands and waters could be affected by CM2-CM10. The majority of these impacts
 7 are attributable to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4,
 8 which would likely result in an improvement of wetland function in the Plan Area. These theoretical
 9 footprints have been used to predict the acres of natural communities that would be affected
 10 through loss or conversion, which gives some indication of jurisdictional wetland effects. Any CM2-
 11 CM10 effects ascribed to tidal perennial aquatic, tidal brackish emergent, tidal freshwater emergent,
 12 other natural seasonal, nontidal freshwater perennial emergent, and nontidal perennial aquatic
 13 wetlands natural communities are likely to also be effects on wetlands and other waters of the
 14 United States. Effects ascribed to other natural communities and land cover types with small
 15 jurisdictional wetland components (valley/foothill riparian, alkali seasonal wetland complex, vernal
 16 pool complex, managed wetland, grassland and cultivated land) are not easily converted to effects
 17 on wetlands and other Waters of the US by the use of theoretical footprints. Because of this lack of
 18 detail, a programmatic assessment is provided for these other conservation measures.

19 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland
 20 natural communities through implementation of CM2-CM10 for Alternative 1B would be
 21 approximately 19,850 acres in the range of 5,500 to 6,000 acres, assuming that 100 percent of the
 22 predominantly wetland natural communities listed in Table 12-1B-69 and that 10 percent of all of
 23 the non-wetland natural communities listed in that table would qualify as wetlands or other waters
 24 of the United States under the CWA. Most of these wetlands would be converted to tidal and nontidal
 25 wetlands and open water through implementation of CM4, and CM10. Although the increase in
 26 wetland acreage and wetland functions from these restoration actions could in part offset the effects
 27 on waters of the U.S. occurring in these areas, implementation of Mitigation Measure BIO-176,
 28 Compensatory Mitigation for Fill of Waters of the U.S., would be required to ensure that these effects
 29 are not adverse. The wetlands and open water created by these two restoration actions would be
 30 approximately 66,200 acres, far exceeding what is required under the no net loss policy used by the
 31 USACE in considering Section 404 permits, even if one were to assume that all conversions
 32 represented a functional wetland loss. Therefore, there would be a beneficial effect on potential
 33 jurisdictional wetlands and other waters of the United States from implementing CM2-CM10.

34 **CEQA Conclusion:** The conversion of existing wetland natural communities to other types of
 35 wetland natural communities through implementation of CM2-CM10 for Alternative 1B would be
 36 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
 37 water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities
 38 would be restored under Alternative 1B. Although the increase in wetland acreage and wetland
 39 functions from these restoration could in part offset the effects on waters of the U.S. occurring in
 40 these areas, implementation of Mitigation Measure BIO-176, Compensatory Mitigation for Fill of
 41 Waters of the U.S., would be required to ensure that the impacts are reduced to a less-than-
 42 significant level.

43 The permanent and temporary loss of potential jurisdictional wetlands as a result of implementing
 44 the other conservation measures (CM2-CM10) of Alternative 1B would be a significant adverse
 45 impact if not compensated for by wetland protection and/or restoration. This loss would represent
 46 a removal of federally protected wetlands or other waters of the United States as defined by Section

1 ~~404 of the CWA. However, Alternative 1B includes conservation measures (CM4 and CM10) that~~
2 ~~would restore large acreages of both tidal and nontidal wetlands and open water in the study area.~~
3 ~~Over the life of the BDCP restoration program, this alternative would result in restoration of 66,200~~
4 ~~acres of tidal and nontidal wetlands and open water, of which 19,550 acres would be restored in the~~
5 ~~first 10 years. These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for~~
6 ~~Alternative 1B (5,500–6,000 acres). Therefore, there would be a beneficial impact on potential~~
7 ~~jurisdictional wetlands and other waters of the United States from implementing CM2–CM10.~~

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

General Terrestrial Biology

Wetlands and Other Waters of the United States

Alternative 1C actions would both permanently and temporarily remove or convert wetlands and open water that ~~is potentially jurisdictional as are~~ regulated by USACE under Section 404 of the CWA. The 404 regulations and relevant information on mitigation the effects of impact to wetlands and waters of the United States (U.S.) are described in Section 12.2.1.1 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS. The following two impacts address the project-level effects of CM1 on these potential wetlands and waters, and the programmatic-level effects of other relevant conservation actions (CM2–CM10). CM11–~~CM22–CM21~~ would not directly result in loss or conversion of wetlands or other waters of the ~~United States~~U.S. The methods used to conduct these analyses are described in Section 12.3.2.4 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS. The waters of the U.S. data used for this analysis is based on a verified wetland delineation from the USACE that was completed in early 2015. These waters of the U.S. were mapped at finer scale than that which was done for the natural community mapping for the BDCP and therefor the acreages of these two datasets differ when compared to each other. The waters of the U.S. mapping identified numerous agricultural ditches and seasonal wetlands occurring within and associated with cultivated lands, which explains the majority of the difference.~~of this chapter.~~

Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and Other Waters of the United States

Alternative 1C proposes the construction, maintenance, and operation of water conveyance facilities within, or requiring the unavoidable fill of, waters of the U.S. The estimated fill of jurisdictional waters associated with this alternative is described in Table 12-1C-69 below. ~~Construction of the Alternative 1C water conveyance facilities would both temporarily and permanently remove potential wetlands and other waters of the United States as regulated by Section 404 of the CWA (Table 12-1C-69).~~ Based on the methodology used to conduct this analysis, these losses would occur at pipeline, canal and intake areas, RTM and borrow/spoil storage sites, transmission corridors, forebay site, and multiple temporary work areas associated with the construction activity. The permanent open water and wetland losses ~~(416 acres)~~ would occur at various locations along the water conveyance facility alignment, but the majority of the loss would occur due to construction of Alternative 1C's five intake structures along the western bank of the Sacramento River from just north of Clarksburg to Courtland in the north Delta (including associated spoil/borrow areas), along the entire canal route in the west and south Delta, and at the southern forebay site in the south Delta. The temporary open water and wetland effects ~~(217 acres)~~ would also occur mainly at the five intake construction sites along the western bank of the Sacramento River, at temporary siphon work areas where the canal crosses under north and west Delta sloughs and waterways, and at barge offloading sites in the west Delta.

1 **Table 12-1C-69. Estimated Fill of Waters of the U.S. Associated with the Construction of Water**
 2 **Conveyance Facilities under Alternative 1C (acres) Loss of Potential Wetlands and Other Waters of the**
 3 **United States from Construction of Alternative 1C Water Conveyance Facilities**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as		Total Impact
		Permanent ¹	Temporary Impact	
Agricultural Ditch	242.4	57.1	0	299.5
Alkaline Wetland	55.6	9.4	0	65.0
Clifton Court Forebay	0	0	0	0
Conveyance Channel	15.2	14.3	0	29.5
Depression	3.7	1.3	0	5.0
Emergent Wetland	116.9	24.3	0	141.2
Forest	1.6	14.4	0	16.0
Lake	0.2	3.7	0	3.9
Natural Channel	0.1	0.1	0	0.2
Scrub-Shrub	3.0	4.5	0	7.5
Seasonal Wetland	67.0	20.8	0	87.7
Tidal Channel	27.1	116.5	0	143.6
Vernal Pool	0.1	0	0	0.1
Total	533	266	0	799

4

Wetland/Other Water Type ^a	Permanent	Temporary	Total
Open Water			
Nontidal Flow	254	60	314
Muted Tidal Flow	0	0	0
Tidal Flow	24	116	140
Pond or Lake (nontidal)	39	5	44
Clifton Court Forebay	0	0	0
Wetland			
Nontidal Wetland	84	17	101
Tidal Wetland	3	13	16
Seasonal Wetland	12	6	18
Total Impact Acres	416	217	633

^a——— Wetland types are described in the methods section of this chapter (Section 12.3.2.4).
Source: California Department of Water Resources 2013.

5
 6 The majority of the impacts on wetlands and waters of U.S. are on wetlands and waters found within
 7 cultivated lands (agricultural ditches and seasonal wetlands), emergent wetlands, and tidal
 8 channels. These impacts mostly result from reusable tunnel material storage area, the construction
 9 of the canal, siphon work areas, and intake work areas. The impacted seasonal wetlands mapped

¹ Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

1 within the Conveyance Planning Area, as described in Section 12.3.2.4 in Appendix A, Draft EIR/EIS
2 In-Text Chapter Revisions, of this RDEIR/SDEIS, all occur in the central Delta within plowed
3 agricultural fields.

4 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
5 functions due to construction activities are fully compensated. Wetland functions are defined as a
6 process or series of processes that take place within a wetland. These include the storage of water,
7 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
8 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
9 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
10 do they perform all functions equally well. The location and size of a wetland may determine what
11 functions it will perform. For example, the geographic location may determine its habitat functions,
12 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
13 quality functions. Many factors determine how well a wetland will perform these functions: climatic
14 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
15 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
16 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
17 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
18 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
19 ground and nursery for numerous species. Many endangered plant and animal species are
20 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
21 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
22 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
23 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
24 include the trapping of sediment, pollution control, and the biochemical processes that take place as
25 water enters, is stored in, or leaves a wetland.

26 The functions of the waters of the U.S. that will be temporarily or permanently impacted by this
27 alternative vary greatly depending primarily on existing land uses and historical levels of
28 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
29 maintained and often devoid of vegetation, support only minimal hydraulic function (water
30 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
31 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
32 quality functions (e.g. reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
33 channels affected by this alternative support functions in all three categories, but the level at which
34 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
35 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
36 disturbance due to past land uses. Although these features likely support habitat, water quality, and
37 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
38 depending on the overall ecological setting and level of disturbance. Functions associated with
39 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
40 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
41 waterway, these features are expected to function at a high level. However, where these habitats
42 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
43 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
44 such, their habitat functions have been greatly compromised, but they retain some water quality and
45 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
46 areas; however the depressions may support wetland vegetation at their edges. The areas mapped

1 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
2 relatively small, each lake is likely performing functions from all three categories.

3 A functional assessment of wetlands proposed for fill will be conducted during the development of
4 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
5 assessment will be compared to the expected functions at the proposed mitigation site(s) such that
6 it can be confirmed that the compensatory mitigation will in fact accomplish full functional
7 replacement of impacted wetlands. All impacted wetlands will be replaced with fully functional
8 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
9 hydrologic/hydraulic function. Since many impacted wetlands will be significantly less than high
10 function, the compensatory mitigation will result in a net increase in wetland function.

11 Alternative 1C was designed to avoid waters of the U.S. to the maximum extent practicable. Each of
12 the conveyance components has been located in upland areas where it was feasible to do so. Once
13 construction begins, specific measures will be implemented, as described in the AMMs set out in
14 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP and in Appendix D,
15 Substantive BDCP Revisions, of this RDEIR/SDEIS (AMM6), to further avoid and minimize effects to
16 waters of the U.S. as well as to special-status species. The AMMs will be implemented at all phases of
17 a project, from siting through design, construction, and on to operations and maintenance. The
18 AMMs that pertain specifically to waters of the U.S. are 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, AMM10 Restoration of Temporarily Affected Natural
23 Communities, AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and Alignment
24 Guidelines, AMM34 Construction Site Security, and AMM36 Notification of Activities in Waterways.

25 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
26 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
27 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, will also
28 result in further avoidance and minimization of effects to waters of the United States.

29 Aside from wetland habitats that would be created as a result of implementing CMs 4-10,, some of
30 which could serve the dual purpose of offsetting effects to species and mitigating impacts on waters
31 of the U.S., more specific mitigation is required to ensure that there is no net loss of wetland
32 functions and values as a result of implementing Alternative 1C pursuant to USACE's and U.S. EPA's
33 Mitigation Rule (see Section 12.2.1.1 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions of this
34 RDEIR/SDEIS). Mitigation Measure BIO-176, Compensatory Mitigation for Fill of Waters of the U.S.,
35 would be available to address adverse impacts on waters of the U.S.

36 **NEPA Effects:** The permanent and temporary loss of these ~~potential~~ jurisdictional wetlands and
37 waters as a result of constructing Alternative 1C water conveyance facilities would be a substantial
38 effect if not compensated by wetland protection and/or restoration. This loss would represent a
39 removal of federally protected wetlands as defined by Section 404 of the CWA. ~~However, Alternative~~
40 ~~1C includes conservation measures (CM4 and CM10) that would restore and protect large acreages~~
41 ~~of both tidal and nontidal wetlands and open water in the study area. Through the course of the~~
42 ~~BDCP restoration program, this alternative would restore 65,000 acres of tidal and 1,200 acres of~~
43 ~~nontidal wetland or open water.~~ Impacts on wetlands from CM1 construction would occur in the
44 first 10 years after BDCP approval. Approximately 19,550 acres of this wetland restoration would

1 occur during this time period, ~~thereby offsetting the impacts of CM1 construction. The Plan under~~
2 ~~Alternative 1C would implement AMMs 1-7, 10, 12, 30, 34, and 36, which would avoid and minimize~~
3 ~~fill of wetlands and waters and any indirect effects to wetlands and waters. Specific mitigation~~
4 ~~would be required to ensure that Alternative 1C does not result in a loss of functions and values of~~
5 ~~waters of the U.S. and thus that the affect is not adverse. Mitigation Measure BIO-176, *Compensatory*~~
6 ~~*Mitigation for Fill of Waters of the U.S.*, would be available to reduce these effects such that they are~~
7 ~~not adverse. These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for~~
8 ~~Alternative 1C (633 acres). Therefore, there would be an overall beneficial effect on potential~~
9 ~~jurisdictional wetlands and other waters of the United States from BDCP implementation.~~

10 **CEQA Conclusion:** The permanent and temporary loss of ~~potential~~ jurisdictional wetlands and
11 waters as a result of constructing Alternative 1C water conveyance facilities would be substantial
12 effect if not compensated for by wetland protection and/or restoration. This loss would represent
13 either temporary or permanent removal of federally protected wetlands or other waters of the
14 United States as defined by Section 404 of the CWA. ~~Specific mitigation would be required to ensure~~
15 ~~that Alternative 1C does not result in a loss of functions and values of waters of the U.S. Mitigation~~
16 ~~Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the U.S.*, would be available to reduce~~
17 ~~the impact to a less-than-significant level. Alternative 1C does propose to restore up to 76,721 acres~~
18 ~~of wetland natural communities under the Plan, which would include 65,000 acres of tidal marsh~~
19 ~~restoration (CM4), 10,000 acres of seasonally inundated floodplain restoration (CM5), 21 acres of~~
20 ~~vernal pool/alkali seasonal wetlands (CM9; 67 acres of vernal pool complex and 72 acres of alkali~~
21 ~~seasonal wetland complex assuming a wetland density of 15%), and 1,700 acres of nontidal marsh~~
22 ~~restoration (CM10). In addition, Alternative 1C would restore 5,000 acres of riparian habitat (CM7),~~
23 ~~some portion of which may also qualify as forested or scrub-shrub wetland. In addition, 20 miles of~~
24 ~~levees will have channel margin enhancement conducted on them (CM6), which would include~~
25 ~~improving channel geometry and restoring riparian, marsh, and mudflat habitats on the water side~~
26 ~~of levees.~~

27 ~~The success in implementing these Conservation Measures would be assured through effectiveness~~
28 ~~monitoring, which includes success criteria, and adaptive management as outlined in the *Adaptive*~~
29 ~~*Management and Monitoring* sections of the Draft BDCP for tidal marsh restoration (Draft BDCP~~
30 ~~Section 3.4.4.4), seasonal floodplain restoration (Draft BDCP Section 3.4.5.4), channel margin~~
31 ~~enhancement (Draft BDCP Section 3.4.6.4), valley/foothill riparian restoration (Draft BDCP Section~~
32 ~~3.4.7.4), vernal pool and alkali seasonal wetland complex restoration (Draft BDCP Section 3.4.9.4),~~
33 ~~and nontidal marsh restoration (Draft BDCP Section 3.4.10.3). All restored areas will be secured in~~
34 ~~fee-title or through conservation easements.~~

35 ~~Alternative 1C would also result in the protection and management of the following natural~~
36 ~~communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool~~
37 ~~complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50~~
38 ~~acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands~~
39 ~~will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and~~
40 ~~agricultural ditches.~~

41 ~~However, Alternative 1C includes conservation measures (CM4 and CM10) that would restore and~~
42 ~~protect large acreages of both tidal and nontidal wetlands and open water. Through the course of~~
43 ~~the BDCP restoration program, this alternative would result in restoration of 65,000 acres of tidal~~
44 ~~and 1,200 acres of nontidal wetlands and open water. The Plan under Alternative 1C would also~~
45 ~~implement AMMs 1-7, 10, 12, 30, 34, and 36, which would avoid and minimize fill of wetlands and~~

1 ~~waters and any indirect effects to wetlands and waters. Impacts on wetlands from CM1 construction~~
2 ~~would occur in the first 10 years after BDCP approval. Approximately 19,550 acres of this wetland~~
3 ~~restoration would occur during this time period, thereby offsetting the impacts of CM1 construction.~~
4 ~~As stated above, specific mitigation would be required to ensure that Alternative 1C does not result~~
5 ~~in a loss of functions and values of waters of the U.S. Mitigation Measure BIO-176, *Compensatory*~~
6 ~~*Mitigation for Fill of Waters of the U.S.*, would be available to reduce the impact to a less-than-~~
7 ~~significant level. These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement~~
8 ~~for Alternative 1C (633 acres). Therefore, there would be a beneficial impact on potential~~
9 ~~jurisdictional wetlands and other waters of the United States from BDCP implementation.~~

10 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.**

11 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
12 success monitoring, long-term preservation, and long-term maintenance and monitoring
13 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
14 replace lost function through the mechanisms discussed below which will result in restoration
15 and/or creation of habitat with at least as much function and value as those of the impacted
16 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
17 than that of impacted habitat.

18 Compensation ratios are driven by type, condition, and location of replacement habitat as
19 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
20 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
21 accept preservation as the only form of mitigation; use of preservation as mitigation typically
22 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
23 minimum of 1:1, depending on the factors listed above.

24 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
25 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
26 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
27 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
28 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
29 combination of the following methods:

- 30 ● Purchase credits for restored/created/rehabilitated habitat at an approved wetland
31 mitigation bank;
- 32 ● On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
33 converted to uplands due to past land use activities (such as agriculture) or functionally
34 degraded by such activities;
- 35 ● On-site (adjacent to the project footprint) creation of aquatic habitat;
- 36 ● Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
37 due to past land use activities (such as agriculture) or functionally degraded by such
38 activities;
- 39 ● Off-site (within the Delta) creation of aquatic habitat; and/or
- 40 ● Payment into the Corps' Fee-in-Lieu program.

1 Purchase of Credits or Payment into Fee-in-Lieu Program

2 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
3 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
4 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
5 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
6 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
7 these categories.

8 On-Site Restoration, Rehabilitation and/or Creation

9 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
10 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
11 could occur immediately adjacent to the project footprint. It is anticipated that some of the
12 compensatory mitigation will fall into this category.

13 Off-Site Restoration, Rehabilitation and/or Creation

14 There exists, within the immediate vicinity of the project area, Delta land which has been subject
15 to agricultural practices or other land uses which have degraded or even converted wetlands
16 that existed historically. Sites within the Delta will be evaluated for their restoration,
17 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
18 mitigation will fall into this category.

19 Compensatory mitigation will result in no net loss of acreage of Waters of the U.S. and will
20 accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
21 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
22 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
23 at significantly less than high levels, the compensatory mitigation will result in a significant net
24 increase in wetland function.

25 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**
26 **Wetlands and Other Waters of the United States**

27 The habitat protection and restoration activities associated with Alternative 1C's other conservation
28 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and other
29 waters of the ~~United States~~U.S. in the study area during the course of BDCP conservation action
30 implementation. Because these conservation measures have not been defined to the level of site-
31 specific footprints, it is not possible to delineate and quantify these effects in detail. Several of the
32 conservation measures (CM2, CM4, and CM5) have been described with theoretical footprints for
33 purposes of the effects analysis contained in Chapter 5, Effects Analysis, of the Draft BDCP of the
34 BDCP.

35 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
36 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
37 from CM2-CM10 were analyzed by looking at effects on wetland natural communities mapped
38 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
39 predominantly wetland natural communities listed in Appendix 12E found in Appendix A, Draft
40 EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS and that 10% of all of the non-wetland
41 natural communities listed in that table would qualify as wetlands or other waters of the United
42 States under the CWA. Based on this approach approximately 19,850 acres of potentially

1 jurisdictional wetlands and waters could be affected by CM2-CM10. The majority of these impacts
2 are attributable to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4,
3 which would likely result in an improvement of wetland function in the Plan Area.

4 ~~These theoretical footprints have been used to predict the acres of natural communities that would~~
5 ~~be affected through loss or conversion, which gives some indication of jurisdictional wetland effects.~~
6 ~~Any CM2–CM10 effects ascribed to tidal perennial aquatic, tidal brackish emergent, tidal freshwater~~
7 ~~emergent, other natural seasonal, nontidal freshwater perennial emergent, and nontidal perennial~~
8 ~~aquatic wetlands natural communities are likely to also be effects on wetlands and other waters of~~
9 ~~the United States. Effects ascribed to other natural communities and land cover types with small~~
10 ~~jurisdictional wetland components (valley/foothill riparian, alkali seasonal wetland complex, vernal~~
11 ~~pool complex, managed wetland, grassland and cultivated land) are not easily converted to effects~~
12 ~~on wetlands and other Waters of the US by the use of theoretical footprints. Because of this lack of~~
13 ~~detail, a programmatic assessment is provided for these other conservation measures.~~

14 ***NEPA Effects:*** ~~The conversion of existing wetland natural communities to other types of wetland~~
15 ~~natural communities through implementation of CM2–CM10 for Alternative 1C would be~~
16 ~~approximately 19,850 acres in the range of 5,500 to 6,000 acres, assuming that 100 percent of the~~
17 ~~predominantly wetland natural communities listed in Table 12-1C-69 and that 10 percent of all of~~
18 ~~the non-wetland natural communities listed in that table would qualify as wetlands or other waters~~
19 ~~of the United States under the CWA. Most of these wetlands would be converted to tidal and nontidal~~
20 ~~wetlands and open water through implementation of CM4 and CM10. Although the increase in~~
21 ~~wetland acreage and wetland functions from these restoration actions could in part offset the effects~~
22 ~~on waters of the U.S. occurring in these areas, implementation of Mitigation Measure BIO-176,~~
23 ~~Compensatory Mitigation for Fill of Waters of the U.S., would be required to ensure that these effects~~
24 ~~are not adverse. The wetlands and open water created by these two restoration actions would be~~
25 ~~approximately 66,200 acres, far exceeding what is required under the no net loss policy used by the~~
26 ~~USACE in considering Section 404 permits, even if one were to assume that all conversions~~
27 ~~represented a functional wetland loss. Therefore, there would be a beneficial effect on potential~~
28 ~~jurisdictional wetlands and other waters of the United States from implementing CM2–CM10.~~

29 ***CEQA Conclusion:*** ~~The conversion of existing wetland natural communities to other types of~~
30 ~~wetland natural communities through implementation of CM2–CM10 for Alternative 1C would be~~
31 ~~approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open~~
32 ~~water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities~~
33 ~~would be restored under Alternative 1C. Although the increase in wetland acreage and wetland~~
34 ~~functions from these restoration could in part offset the effects on waters of the U.S. occurring in~~
35 ~~these areas, implementation of Mitigation Measure BIO-176, Compensatory Mitigation for Fill of~~
36 ~~Waters of the U.S., would be required to ensure that the impacts are reduced to a less-than-~~
37 ~~significant level.~~

38 ~~The permanent and temporary loss of potential jurisdictional wetlands as a result of implementing~~
39 ~~the other conservation measures (CM2–CM10) of Alternative 1C would be a substantial effect if not~~
40 ~~compensated for by wetland protection and/or restoration. This loss would represent a removal of~~
41 ~~federally protected wetlands or other waters of the United States as defined by Section 404 of the~~
42 ~~CWA. However, Alternative 1C includes conservation measures (CM4 and CM10) that would restore~~
43 ~~large acreages of both tidal and nontidal wetlands and open water in the study area. Over the life of~~
44 ~~the BDCP restoration program, this alternative would result in restoration of 66,200 acres of tidal~~
45 ~~and nontidal wetlands and open water, of which 19,550 acres would be restored in the first 10~~

1 ~~years. These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for~~
2 ~~Alternative 1C (5,500–6,000 acres). Therefore, there would be a beneficial impact on potential~~
3 ~~jurisdictional wetlands and other waters of the United States from implementing CM2–CM10.~~

12.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five Intakes (15,000 cfs; Operational Scenario B)

Comparative Differences in CM1 Construction Effects for Alternatives 1A and 2A

Due to the change in location of the two intakes and their associated pumps and pipelines, Alternative 2A would create minor differences in the permanent and temporary loss of natural communities and cultivated lands during water conveyance facilities construction when compared with Alternative 1A (Table 12-2A-1). All of these differences would occur during the near-term timeframe associated with water facilities construction. Alternative 2A would permanently remove 3 fewer acres of valley/foothill riparian habitat along the Sacramento River, 7 acres more of grassland and 14 acres more of cultivated land in the same area when compared to Alternative 1A. Alternative 2A would also permanently affect a larger acreage of ~~potential~~ jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (~~1-2~~ acres more; see Table 12-2A-2). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary jurisdictional waters and wetlands impacts.

During the water conveyance facilities construction process, Alternative 2A would involve slightly more temporary loss of habitat when compared with Alternative 1A because of the lengthy pipelines needed to serve Intakes 6 and 7. The differences would include cultivated lands east of the river (492 acres more), tidal perennial aquatic within the river channel (7 acres more), valley/foothill riparian along the river levee(4 acres more), and grassland along the river levee (9 acres more; see Table 12-2A-1). Alternative 2A would also temporarily affect a larger acreage of ~~potential~~ jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (~~19-20~~ acres more; see Table 12-2A-2).

Table 12-2A-2 Alternative 2A Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1A (acres)

Wetland/Water Type	Alternative 2A Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1A	Temporary Impact	Difference from Alternative 1A
Agricultural Ditch	65.8	0.9	32.6	9.1
Alkaline Wetland	0.1	0.0	0	0.0
Clifton Court Forebay	1.0	0.0	0	0.0
Conveyance Channel	12.7	0.0	1.1	0.0
Depression	1.9	0.0	1.8	0.0
Emergent Wetland	46.8	0.0	6.7	-0.6
Forest	6.4	0.6	15.6	3.6
Lake	0.2	0.2	2.3	2.0
Scrub-Shrub	18.2	-2.4	2.4	-1.9
Seasonal Wetland	18.7	0.0	29.2	2.6
Tidal Channel	45.8	2.9	139.1	5.3
Vernal Pool	0	0.9	0	9.1
Total	218	2.3	231	20.1

1 **Effects of Restoration-Related Conservation Actions of Alternative 2A**

2 **NEPA Effects:** Alternative 2A would not have adverse effects on the terrestrial natural communities,
3 special-status species and common species that occupy the study area. The alternative also would
4 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
5 species, ~~result in a net loss of wetlands and other waters of the United States,~~ reduce the value of
6 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As
7 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's
8 conservation actions, including the construction of water conveyance tunnels from the north Delta
9 to Clifton Court Forebay in the south Delta. The temporarily-affected habitat would be restored to its
10 pre-project condition and the restoration conservation measures (CM2-CM10) would permanently
11 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian
12 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities
13 in the study area would have beneficial effects on covered and noncovered species. Where
14 conservation actions would not fully offset effects, the Plan has developed AMMs and this document
15 has included additional mitigation measures to avoid adverse effects. Alternative 2A would not
16 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

17 **CEQA Conclusion:** Alternative 2A would not have significant and unavoidable impacts on the
18 terrestrial natural communities, special-status species and common species that occupy the study
19 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
20 risk of introducing invasive species, ~~result in a net loss of wetlands and other waters of the United~~
21 ~~States,~~ reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
22 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
23 converted by the Plan's conservation actions, including the construction of water conveyance
24 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily-affected
25 habitat would be restored to its pre-project condition and the restoration conservation measures
26 (CM2-CM10) would permanently replace primarily cultivated land and managed wetland with tidal
27 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
28 sensitive natural communities in the study area would have beneficial effects on covered,
29 noncovered, and common species. Where conservation actions would not fully offset impacts, the
30 Plan has developed AMMs and this document has included additional mitigation measures to avoid
31 significant impacts. Alternative 2A would not require mitigation measures beyond what is proposed
32 for Alternative 1A to offset effects.

33 As with Alternative 1A, Alternative 2A would require several mitigation measures to be adopted to
34 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
35 measures would be needed beyond the impact offsets provided by Alternative 2A AMMs and CM2-
36 ~~CM22-CM21~~ conservation actions. The relevant mitigation measures, which are included in detail in
37 the analysis of Alternative 1A, are as follows:

- 38 • ~~Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.~~
- 39

12.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five Intakes (15,000 cfs; Operational Scenario B)

Comparative Differences in CM1 Construction Effects for Alternatives 1B and 2B

Due to the change in location of the two intakes and their associated pumps and pipelines, Alternative 2B would create minor differences in permanent and larger differences in temporary loss of natural communities and cultivated lands during water conveyance facilities construction when compared with Alternative 1B (Table 12-2B-1). All of these differences would occur in the near-term timeframe associated with water facilities construction. Alternative 2B would permanently remove 3 fewer acres of valley/foothill riparian habitat along the Sacramento River and 1 fewer acre of cultivated land (primarily alfalfa and irrigated pasture) just east of the river. When compared with Alternative 1B, Alternative 2B would permanently remove 6 acres more of grassland and 1 acre more of tidal perennial aquatic natural community along the eastern bank of the river at intake sites. Alternative 2B would also permanently affect a larger acreage of potential jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1B (50.3 acres more; see Table 12-2B-2). Refer to Table 12-1B-69 for a summary of Alternative 1B permanent and temporary jurisdictional waters and wetlands impacts.

Table 12-2B-2 Alternative 2B Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1B (acres)

Wetland/Water Type	Alternative 2B Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1B	Temporary Impact	Difference from Alternative 1B
Agricultural Ditch	228.2	0.3	38.5	7.4
Alkaline Wetland	0.1	0	0	0
Clifton Court Forebay	1.0	0	0	0
Conveyance Channel	12.7	0	1.1	0
Depression	35.1	0	1.9	0
Emergent Wetland	77.8	0.2	23.8	3.8
Forest	9.9	0.7	13.7	6.7
Lake	0.2	0	0	-0.3
Scrub-Shrub	11.4	-2.4	11.0	-1.2
Seasonal Wetland	177.7	0.2	4.1	4.1
Tidal Channel	31.9	3.9	174.7	28.4
Vernal Pool	0	0	0	0
Total	586	2.8	269	49.0

During the water conveyance facilities construction process, Alternative 2B would involve significantly more temporary loss of tidal perennial aquatic habitat (26 acres), valley/foothill riparian habitat (17 acres) and grassland (24 acres). These temporary losses would occur primarily along Snodgrass Slough and the north-south irrigation canal just east of the slough. The Alternative 2B pipelines would also temporarily affect greater acreages of cultivated land (496 acres more), including alfalfa, vineyard, orchard and other cultivated cropland. There would be much smaller

1 differences in the acreage of temporary effect on managed wetland and tidal freshwater emergent
2 wetland (Table 12-2B-1). Alternative 2B would also temporarily affect a larger acreage of **potential**
3 jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared
4 to Alternative 1B (49 acres more; [see Table 12-2B-2](#)).

5 **Effects of Restoration-Related Conservation Actions of Alternative 2B**

6 **NEPA Effects:** Alternative 2B would not have adverse effects on the terrestrial natural communities,
7 special-status species and common species that occupy the study area except for an adverse effect
8 on giant garter snake population connectivity and to wildlife movement corridors in general. The
9 construction of the canal would substantially inhibit the movement of giant garter snakes and other
10 wildlife from moving within and outside of the Delta. This alternative would not significantly
11 increase the risk of introducing invasive species, **result in a net loss of wetlands and other waters of**
12 **the United States**, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans
13 and policies that affect the study area. As with Alternative 1B, there would be large acreages of
14 existing habitat converted by the Plan's conservation actions, including the construction of the water
15 conveyance canal from the north Delta to Clifton Court Forebay in the south Delta. The temporarily-
16 affected habitat would be restored to its pre-project condition and the restoration conservation
17 measures (CM2-CM10) would permanently replace primarily cultivated land and managed wetland
18 with tidal and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and
19 value of the sensitive natural communities in the study area would have beneficial effects on
20 covered and noncovered species. Where conservation actions would not fully offset effects, the Plan
21 has developed AMMs and this document has included additional mitigation measures to avoid and
22 minimize adverse effects to the maximum extent practicable. Alternative 2B would not require
23 mitigation measures beyond what is proposed for Alternative 1B to offset effects.

24 **CEQA Conclusion:** Alternative 2B would not have significant and unavoidable impacts on the
25 terrestrial natural communities, special-status species and common species that occupy the study
26 area except for giant garter snake habitat connectivity and to wildlife movement corridors in
27 general. The construction of the canal would substantially inhibit the movement of giant garter
28 snakes and other wildlife from moving within and outside of the Delta. The alternative would not
29 increase the risk of introducing invasive species, **result in a net loss of wetlands and other waters of**
30 **the United States**, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans
31 and policies that affect the study area. As with Alternative 1B, there would be large acreages of
32 existing habitat converted by the Plan's conservation actions, including the construction of water
33 conveyance tunnels from the north Delta to Clifton Court Forebay in the south Delta. The
34 temporarily-affected habitat would be restored to its pre-project condition and the restoration
35 conservation measures (CM2-CM10) would permanently replace primarily cultivated land and
36 managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The increases in
37 acreage and value of the sensitive natural communities in the study area would have beneficial
38 effects on covered, noncovered, and common species. Where conservation actions would not fully
39 offset impacts, the Plan has developed AMMs and this document has included additional mitigation
40 measures to avoid and minimize significant impacts. Alternative 6B would not require mitigation
41 measures beyond what is proposed for Alternative 1B to offset effects. Despite these measures,
42 there would remain significant and unavoidable impacts on giant garter snake population
43 connectivity and wildlife movement corridors from Alternative 2B.

44 As with Alternative 1B, Alternative 2B would require several mitigation measures to be adopted to
45 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation

1 measures would be needed beyond the impact offsets provided by Alternative 2B AMMs and CM2–
2 ~~CM22~~CM21 conservation actions. The relevant mitigation measures, which are included in detail in
3 the analysis of Alternative 1B, are as follows:

- 4 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.
5

12.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and Intakes 1 and 2 (6,000 cfs; Operational Scenario A)

Comparative Differences in CM1 Construction Effects for Alternatives 3 and 1A

Due to the elimination of Intakes 3–5 and their associated pumps and pipelines, Alternative 3 would create differences in the permanent and temporary loss of natural communities and cultivated lands during water conveyance facilities construction when compared with Alternative 1A (Table 12-3-1). All of these differences would occur during the near-term timeframe associated with water conveyance facilities construction. Alternative 3 would permanently remove 9 fewer acres of tidal perennial aquatic habitat in the Sacramento River, 10 fewer acres of valley/foothill riparian habitat along the eastern bank of the Sacramento River, 11 fewer acres of grassland adjacent to the river, and 118 acres of cultivated land just east of the river, all associated with less intake construction along the eastern bank of the Sacramento River in the vicinity of Hood. Alternative 3 would also permanently affect a smaller acreage of ~~potential~~ jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared with Alternative 1A (10 acres fewer; see Table 12-3-2). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary jurisdictional waters and wetlands impacts.

There would be similar reductions in temporary losses of natural communities along the Sacramento River, including 32 fewer acres of tidal perennial aquatic, 3 acres fewer of tidal freshwater emergent wetland, 10 acres fewer of valley/foothill riparian, one acre fewer of nontidal perennial aquatic, 28 acres fewer grassland, and 348 acres fewer of cultivated land (Table 12-3-1). Alternative 3 would also temporarily affect a smaller acreage of ~~potential~~ jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (40 39 acres fewer; see Table 12-3-2).

Table 12-3-2 Alternative 3 Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1A (acres)

<u>Alternative 3 Impacts on Jurisdictional Wetlands and Waters</u>				
<u>Wetland/Water Type</u>	<u>Permanent Impact</u>	<u>Difference from Alternative 1A</u>	<u>Temporary Impact</u>	<u>Difference from Alternative 1A</u>
<u>Agricultural Ditch</u>	<u>64.8</u>	<u>-0.2</u>	<u>21.0</u>	<u>-2.5</u>
<u>Alkaline Wetland</u>	<u>0.1</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Clifton Court Forebay</u>	<u>1.0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Conveyance Channel</u>	<u>12.7</u>	<u>0</u>	<u>1.1</u>	<u>0</u>
<u>Depression</u>	<u>1.9</u>	<u>0</u>	<u>1.8</u>	<u>0</u>
<u>Emergent Wetland</u>	<u>46.8</u>	<u>0</u>	<u>4.7</u>	<u>-2.5</u>
<u>Forest</u>	<u>5.8</u>	<u>0</u>	<u>11.3</u>	<u>-0.7</u>
<u>Lake</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>-0.3</u>
<u>Scrub-Shrub</u>	<u>18.2</u>	<u>-2.4</u>	<u>2.1</u>	<u>-2.2</u>
<u>Seasonal Wetland</u>	<u>18.7</u>	<u>0</u>	<u>26.6</u>	<u>0</u>
<u>Tidal Channel</u>	<u>35.0</u>	<u>-7.9</u>	<u>102.8</u>	<u>-31.0</u>
<u>Vernal Pool</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Total</u>	<u>205</u>	<u>-10</u>	<u>171</u>	<u>-39</u>

1 **Effects of Restoration-Related Conservation Actions of Alternative 3**

2 **NEPA Effects:** Alternative 3 would not have adverse effects on the terrestrial natural communities,
3 special-status species and common species that occupy the study area. The alternative also would
4 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
5 species, ~~result in a net loss of wetlands and other waters of the United States,~~ reduce the value of
6 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As
7 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's
8 conservation actions, including the construction of water conveyance tunnels from the north Delta
9 to Clifton Court Forebay in the south Delta. The temporarily-affected habitat would be restored to its
10 pre-project condition and the restoration conservation measures (CM2-CM10) would permanently
11 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian
12 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities
13 in the study area would have beneficial effects on covered and noncovered species. Where
14 conservation actions would not fully offset effects, the Plan has developed AMMs and this document
15 has included additional mitigation measures to avoid adverse effects. Alternative 3 would not
16 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

17 **CEQA Conclusion:** Alternative 3 would not have significant and unavoidable impacts on the
18 terrestrial natural communities, special-status species and common species that occupy the study
19 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
20 risk of introducing invasive species, ~~result in a net loss of wetlands and other waters of the United~~
21 ~~States,~~ reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
22 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
23 converted by the Plan's conservation actions, including the construction of water conveyance
24 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily-affected
25 habitat would be restored to its pre-project condition and the restoration conservation measures
26 (CM2-CM10) would permanently replace primarily cultivated land and managed wetland with tidal
27 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
28 sensitive natural communities in the study area would have beneficial effects on covered,
29 noncovered, and common species. Where conservation actions would not fully offset impacts, the
30 Plan has developed AMMs and this document has included additional mitigation measures to avoid
31 significant impacts. Alternative 3 would not require mitigation measures beyond what is proposed
32 for Alternative 1A to offset effects.

33 As with Alternative 1A, Alternative 3 would require several mitigation measures to be adopted to
34 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
35 measures would be needed beyond the impact offsets provided by Alternative 3 AMMs and CM2-
36 ~~CM22-CM21~~ conservation actions. The relevant mitigation measures, which are included in detail in
37 the analysis of Alternative 1A, are as follows:

- 38 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.
- 39

12.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)

Chapter 3, Section 3.5.9, *Alternative 4 in Chapter 3, Description of Alternatives, in this RDEIR/SDEIS* provides details of Alternative 4, and Figures 3-9 and 3-10 depicts the alternative.

Natural Communities

Tidal Perennial Aquatic

Construction, operation, maintenance, and management associated with the conservation components of Alternative 4 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 12-4-1). Full implementation of Alternative 4 would also include the following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic natural community (~~BDCP~~ see Chapter 3, Section 3.3, *Biological Goals and Objectives, of the Draft BDCP*).

- 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 *of the Draft 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 12-4-1 and the other tables contained in the analysis of Alternative 4. The near-term (NT) acreage effects listed in the table would occur over the ~~first 10 years~~ *near-term* of Alternative 4 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 would result in periodic inundation of the community.

1 **Table 12-4-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	207178	207178 8	2,098 101 ^e	2,098 01	0	0
CM2	8	8	11	11	9-36	0
CM4	1114	18	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	0	0	0	0
TOTAL IMPACTS	22622 9197	23506	2,109 12	2,114 7	9-36	39

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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 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.

^e The large acreage of tidal perennial aquatic habitat affected by Alternative 4 is related to dredging of Clifton Court Forebay; the habitat would not be permanently removed.

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 for Alternative 4 would permanently affect an estimated ~~23506~~ acres and
8 temporarily remove ~~2,114~~ acres of tidal perennial aquatic natural community in the study area.
9 The large temporary loss of this natural community would be largely related to dredging of Clifton
10 Court Forebay. These modifications represent less than 3% of the 86,263 acres of the community
11 that is mapped in the study area. The majority of the permanent and temporary effects would
12 happen during the ~~first 10 years of near-term time period for~~ Alternative 4 implementation, as water
13 conveyance facilities are constructed and habitat restoration is initiated. Natural communities
14 restoration would add 8,300 acres of tidal wetlands, including an estimated 3,400 acres of tidal
15 perennial aquatic natural community during the same period, which would expand the area of that
16 habitat and offset the losses. The 3,400-acre increase is estimated, based on modeling reported in
17 Draft BDCP Appendix 3.B, Table 5, by comparing existing Plan Area subtidal habitat to near-term
18 subtidal habitat with the Plan. The ~~BDCP beneficial~~ effects analysis (~~BDCP in~~ Chapter 5, Section
19 5.4.1.2, *Beneficial Effects Analysis, of the Draft BDCP*) indicates that, while there would be no
20 minimum restoration requirement for the tidal perennial aquatic natural community, an estimated
21 approximately 27,000 acres of tidal perennial aquatic natural community would be restored based

1 on tidal restoration modeling. This estimate is based on Table 5 in ~~BDCP~~ Appendix 3.B, *BDCP Tidal*
2 *Habitat Evolution Assessment, of the Draft BDCP, by* subtracting late long-term acreage without
3 project from late long-term acreage with project).

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

- 7 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities
8 would permanently remove ~~207178~~ acres and temporarily remove ~~2,098101~~ acres of tidal
9 perennial aquatic community. Most of the permanent loss would occur where Intakes 2, 3, and 5
10 encroach on the Sacramento River's east bank between Clarksburg and Courtland (see
11 Terrestrial Biology Mapbook, ~~a support document to the EIS/EIR in Appendix A, Draft EIR/EIS~~
12 *In-Text Chapter Revisions, of this RDEIR/SDEIS*, for a ~~detailed~~ view of proposed facilities overlain
13 on natural community mapping). The footings and the screens at the intake sites would be
14 placed into the river margin and would displace moderately deep to shallow, flowing open
15 water with a mud substrate and very little aquatic vegetation. Permanent losses would also
16 occur where new control structures would be built into the California Aqueduct and the Delta
17 Mendota Canal adjacent to Clifton Court Forebay, and where permanent new transmission lines
18 would be constructed along Lambert Road just west of Interstate 5.

19 The temporary effects on tidal perennial aquatic habitats would occur at numerous locations,
20 with the largest affect occurring at Clifton Court Forebay, where the entire forebay would be
21 dredged to provide additional storage capacity. Other temporary effects would occur in the
22 Sacramento River at Intakes 2, 3, and 5, and at temporary barge unloading facilities established
23 at three locations along the tunnel route. The barge unloading construction would temporarily
24 affect ~~Snodgrass Slough just south of Hood, Potato Slough at the south end of Boldin Island, the~~
25 ~~South Mokelumne River at the north end of Staten Island, Venice Reach of the San Joaquin River~~
26 ~~at the south end of Venice Island, Old River on the east side of Clifton Court Forebay, Connection~~
27 ~~Slough at the north end of Bacon Island, and Old River just south of its junction with North~~
28 ~~Victoria Canal. The details of these locations can be seen in the Terrestrial Biology Mapbook in~~
29 ~~Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS~~. These losses would
30 take place during the near-term construction period.

- 31 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
32 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
33 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
34 Sacramento Weir improvements. Some of these activities could involve excavation and grading
35 in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on
36 hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11
37 acres could be temporarily removed. This activity would occur primarily in the near-term
38 timeframe.

- 39 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
40 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.
41 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,
42 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent
43 wetlands. Specific locations for these conversions are not known. The 18 acres could remain
44 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one
45 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been

1 taken and the effect has been discussed simultaneously with the habitat losses associated with
2 other conservation measures.

3 An estimated 65,000 acres of tidal wetlands and transitional uplands would be restored during
4 tidal habitat restoration, consistent with BDCP Objective L1.3. Of these acres, an estimated
5 27,000 acres of tidal perennial aquatic habitat would be restored, based on modeling conducted
6 by ESA PWA (refer to Table 5 in ~~BDCP~~ Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment, of*
7 *the Draft BDCP*). This restoration would be consistent with BDCP Objective TPANC1.1.
8 Approximately 3,400 acres of the restoration would happen during the near-term time
9 period ~~first 10 years~~ of Alternative 4 implementation, which would coincide with the timeframe
10 of water conveyance facilities construction. The remaining restoration would be spread over the
11 following ~~30~~ years of Plan implementation. Tidal natural communities restoration is expected to
12 be focused in the ROAs identified in Figure 12-1. Some of the restoration would occur in the
13 lower Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,
14 Cosumnes/Mokelumne and West Delta ROAs.

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

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 impact conclusions are
33 also included.

34 ***Near-Term Timeframe***

35 During the near-term timeframe (the first ~~10-14~~ years of BDCP implementation), Alternative 4
36 would affect the tidal perennial aquatic community through CM1 construction losses (~~178-207~~ acres
37 permanent and ~~2,101-2,098~~ acres temporary) and the CM2 construction losses (8 acres permanent
38 and 11 acres temporary). These losses would occur primarily at Clifton Court Forebay due to
39 dredging, along the Sacramento River at intake sites, or in the northern Yolo Bypass. Approximately
40 ~~11-14~~ acres of the inundation and construction-related effects resulting from CM4 would occur
41 during the near-term throughout the ROAs mapped in Figure 12-1.

42 The construction losses of this special-status natural community would represent an adverse effect
43 if they were not offset by avoidance and minimization measures and restoration actions associated
44 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be

1 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United
2 States as defined by Section 404 of the CWA. The largest loss would occur at Clifton Court Forebay,
3 and would be temporary. This tidal perennial habitat is of relatively low value to special-status
4 terrestrial species in the study area. The creation of approximately 3,400 acres of high-value tidal
5 perennial aquatic natural community as part of CM4 during the first ~~10-14~~ years of Alternative 4
6 implementation would offset this near-term loss, avoiding any adverse effect. Typical project-level
7 mitigation ratios (1:1 for restoration) would indicate ~~2,3092,338~~ acres of restoration would be
8 needed to offset (i.e., mitigate) the ~~2,3092,338~~ acres of effect (the total permanent and temporary
9 near-term effects listed in Table 12-4-1) associated with near-term activities, including water
10 conveyance facilities construction.

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 and storage sites. The AMMs are
16 described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
17 [updated version of AMM-6 is in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP](#)
18 [Appendix 3.C.](#)

19 **Late Long-Term Timeframe**

20 Implementation of Alternative 4 as a whole would result in relatively minor (less than 3%)
21 conversions of or losses to tidal perennial aquatic community in the study area. These losses or
22 conversions (~~206-235~~ acres of permanent and ~~2,1172,114~~ acres of temporary) would be largely
23 associated with construction of the water conveyance facilities (CM1), construction of Yolo Bypass
24 fish improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation
25 conversions would occur through the course of the BDCP restoration program at various tidal
26 restoration sites throughout the study area. By the end of the Plan timeframe, a total of more than
27 27,000 acres of high-value tidal perennial aquatic natural community would be restored (estimated
28 from Table 5 in [BDCP Appendix 3.B, BDCP Tidal Habitat Evolution Assessment, of the Draft BDCP](#)).
29 The restoration would occur over a wide region of the study area, including within the Suisun
30 Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure 12-1).

31 **NEPA Effects:** The creation of approximately 3,400 acres of high-value tidal perennial aquatic
32 natural community as part of CM4 during the first ~~100~~ years of Alternative 4 implementation would
33 offset near-term losses associated with construction activities for CM1, CM2, CM4 and CM6, avoiding
34 any adverse effect. Alternative 4, which includes restoration of an estimated 27,000 acres of this
35 natural community over the course of the Plan, would not result in a net long-term reduction in the
36 acreage of a sensitive natural community; the effect would be beneficial.

37 **CEQA Conclusion:**

38 **Near-Term Timeframe**

39 Alternative 4 would result in the near-term loss or conversion of approximately ~~2,3092,338~~ acres of
40 tidal perennial aquatic natural community due to construction of the water conveyance facilities
41 (CM1) and fish passage improvements (CM2), and inundation during tidal marsh restoration (CM4).
42 The construction losses would occur primarily at Clifton Court Forebay, along the Sacramento River
43 at intake sites, along various Delta waterways at barge offloading sites, and within the northern

1 section of the Yolo Bypass, while inundation conversions would occur at various tidal restoration
2 sites throughout the study area. The losses and conversions would be spread across the near-term
3 timeframe. These losses and conversions would be offset by planned restoration of an estimated
4 3,400 acres of high-value tidal perennial aquatic natural community scheduled for the first 10 years
5 of Alternative 4 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be
6 implemented to minimize impacts. Because of these offsetting near-term restoration activities and
7 AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for
8 restoration) would indicate that 2,3092,338 acres of restoration would be needed to offset (i.e.,
9 mitigate) the 2,3092,338 acres of loss or conversion. The restoration would be initiated at the
10 beginning of Alternative 4 implementation to minimize any time lag in the availability of this habitat
11 to special-status species, and would result in a net gain in acreage of this sensitive natural
12 community.

13 **Late Long-Term Timeframe**

14 At the end of the Plan period, 2,3232,349 acres of the natural community would be lost or converted
15 and an estimated 27,000 acres of this community would be restored. There would be no net
16 permanent reduction in the acreage of this sensitive natural community within the study area.
17 Therefore, Alternative 4 would not have a substantial adverse effect on this natural community; the
18 impact would be beneficial.

19 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 20 **Perennial Aquatic Natural Community**

21 Two Alternative 4 conservation measures would modify the water depths and inundation/flooding
22 regimes of both natural and man-made waterways in the study area. CM2, which is designed to
23 improve fish passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase
24 periodic inundation of tidal perennial aquatic natural community on small acreages, while CM5
25 would expose this community to additional flooding as channel margins are modified and levees are
26 set back to improve fish habitat along some of the major rivers and waterways throughout the study
27 area.

- 28 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
29 result in an increase in the frequency, magnitude and duration of inundation and changes in
30 water depth and velocity of 9–36 acres of tidal perennial aquatic natural community. The
31 methods used to estimate these inundation acreages are described in BDCP Appendix 5.J, *Effects*
32 *on Natural Communities, Wildlife, and Plants, of the Draft BDCP*. The area more frequently
33 affected by inundation would vary with the flow volume that would pass through the newly
34 constructed notch in the Fremont Weir. The 9-acre increase in inundation would be associated
35 with a notch flow of 1,000 cfs, and the 36-acre increase would result from a notch flow of 4,000
36 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the years.
37 Most of the tidal perennial aquatic community occurs in the southern section of the bypass on
38 Liberty Island, and, to a lesser extent, along the eastern edge of the bypass, including the Tule
39 Canal/Toe Drain. The anticipated change in management of flows in the Yolo Bypass includes
40 more frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in
41 some years, later releases into the bypass in spring months (April and May). The modification of
42 periodic inundation events would be expected to be beneficial to the ecological function of tidal
43 perennial aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo
44 Bypass waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-

1 2 and described in detail in [Draft](#) BDCP Chapter 3, Table 3.2-3. The change in periodic
2 inundation in the bypass would not substantially modify its value for special-status or common
3 terrestrial species. Water depths and water flow rates would increase over Existing Conditions
4 and the No Action condition in approximately 30% of the years, but it would not fragment the
5 habitat or make it less accessible to special-status or common terrestrial species. The
6 modifications would not result in a loss of this community. The plant species associated with
7 this community are adapted to inundation. The extended inundation would be designed to
8 expand foraging and spawning habitat for Delta fishes. The effects of these changes in the
9 inundation regime on terrestrial species that rely on tidal perennial aquatic habitats are
10 discussed in detail later in this chapter, under the individual species assessments.

- 11 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
12 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic
13 habitat. Specific locations for this restoration activity have not been identified, but they would
14 likely be focused in the south Delta area, along the major rivers and Delta channels. The more
15 frequent exposure of these wetlands to stream flooding events would be beneficial to the
16 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target
17 aquatic species. The plant species associated with these tidal perennial aquatic areas are
18 adapted to inundation and would not be substantially modified.

19 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected
20 to more frequent increases in water depth and velocity as a result of implementing two Alternative 4
21 conservation measures (CM2 and CM5). Tidal perennial aquatic community is already, by definition,
22 permanently inundated aquatic habitat of value to terrestrial and aquatic species in the study area;
23 therefore, periodic changes in water depth and velocity would not result in a net permanent
24 reduction in the acreage of this community in the study area.

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

27 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area
28 would be subjected to more frequent increases in water depth and velocity from flood flows as a
29 result of implementing CM2 and CM5 under Alternative 4. Tidal perennial aquatic community is
30 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic
31 species in the study area. The periodic inundation would not result in a net permanent reduction in
32 the acreage of this community in the study area. Therefore, there would be no substantial adverse
33 effect on the community. The impact would be less than significant.

34 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 35 **Operation, Maintenance and Management Activities**

36 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
37 associated with changed water management is in effect, there would be new ongoing and periodic
38 actions associated with operation, maintenance and management of the BDCP facilities and
39 conservation lands that could affect tidal perennial aquatic natural community in the study area. The
40 ongoing actions include diverting Sacramento River flows in the north Delta, and reduced diversion
41 from south Delta channels. These actions are associated with CM1 (see Impact BIO-2 for effects
42 associated with CM2). The periodic actions would involve access road and conveyance facility
43 repair, vegetation management at the various water conveyance facilities and habitat restoration
44 sites (CM13), levee repair and replacement of levee armoring, channel dredging, and habitat

1 enhancement in accordance with natural community management plans. The potential effects of
2 these actions are described below.

- 3 • *Modified river flows upstream of and within the study area and reduced diversions from south*
4 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
5 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
6 channels (associated with Operational Scenario H) would not result in the permanent reduction
7 in acreage of a sensitive natural community in the study area. Flow levels in the upstream rivers
8 would not change such that the acreage of tidal perennial aquatic community would be reduced
9 on a permanent basis. Some increases and some decreases would be expected to occur during
10 some seasons and in some water-year types, but there would be no permanent loss. Similarly,
11 increased diversions of Sacramento River flows in the north Delta would not result in a
12 permanent reduction in tidal perennial aquatic community downstream of these diversions.
13 Tidal influence on water levels in the Sacramento River and Delta waterways would continue to
14 be dominant. Reduced diversions from the south Delta channels would not create a reduction in
15 this natural community.

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

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

1 countermeasure plans and stormwater pollution prevention plans, are described in Appendix
2 3B, Environmental Commitments, of the Draft EIR/EIS. Best management practices, including
3 control of drift and runoff from treated areas, and use of herbicides approved for use in aquatic
4 environments would also reduce the risk of affecting natural communities adjacent to water
5 conveyance features and levees associated with restoration activities.

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

- 16 ● *Channel dredging*. Long-term operation of the Alternative 4 intakes on the Sacramento River
17 would include periodic dredging of sediments that might accumulate in front of intake screens.
18 The dredging would occur in tidal perennial aquatic natural community and would result in
19 short-term increases in turbidity and disturbance of the substrate. These conditions would not
20 eliminate the community, but would diminish its value for special-status and common species
21 that rely on it for movement corridor or foraging area. The individual species effects are
22 discussed later in this chapter.
- 23 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural
24 communities within the Plan Area (CM11). For tidal 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, restrictions on vector control and application of herbicides, and maintenance of
28 infrastructure that would allow for movement through the community. The enhancement efforts
29 would improve the long-term value of this community for both special-status and common
30 species.

31 The various operations and maintenance activities described above could alter acreage of tidal
32 perennial aquatic natural community in the study area through changes in flow patterns and
33 changes in water quality. Activities could also introduce sediment and herbicides that would reduce
34 the value of this community to common and sensitive plant and wildlife species. Other periodic
35 activities associated with the Plan, including management, protection and enhancement actions
36 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
37 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
38 community. While some of these activities could result in small reductions in acreage, these
39 reductions would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural*
40 *Communities Restoration*. The management actions associated with levee repair, periodic dredging
41 and control of invasive plant species would also result in a long-term benefit to the species
42 associated with tidal perennial aquatic habitats by improving water movement.

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

1 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
2 have the potential to create minor losses in total acreage of tidal perennial aquatic natural
3 community in the study area, and could create temporary increases in turbidity and sedimentation.
4 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
5 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
6 these impacts, and other operations and maintenance activities, including management, protection
7 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
8 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
9 improved water movement in these habitats. Long-term restoration activities associated with *CM4*
10 *Tidal Natural Communities Restoration* would greatly expand this natural community in the study
11 area. Ongoing operation, maintenance and management activities would not result in a net
12 permanent reduction in the acreage or value of this sensitive natural community within the study
13 area. Therefore, there would be a less-than-significant impact on the tidal perennial aquatic natural
14 community.

15 **Tidal Brackish Emergent Wetland**

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

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

42 There is a variety of other, less specific conservation goals and objectives in ~~BDCP~~ Chapter 3, Section
43 3.3, [Biological Goals and Objectives, in the Draft BDCP](#) that would improve the value of tidal brackish

1 emergent wetland natural community for terrestrial species. As explained below, with the
 2 restoration and enhancement of these amounts of habitat, in addition to implementation of AMMs,
 3 impacts on this natural community would not be adverse for NEPA purposes and would be less than
 4 significant for CEQA purposes.

5 **Table 12-4-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**
 6 **Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	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
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

Unk. = unknown

7

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

10 Construction of the Alternative 4 water conveyance facilities (CM1) would not affect tidal brackish
 11 emergent wetland natural community.

12 Restoration of tidal marsh habitats associated with CM4 would require site preparation, earthwork,
 13 and other site activities that could remove tidal brackish emergent wetland. Levee modifications,
 14 grading or contouring, filling to compensate for land subsidence, and creation of new channels could
 15 also result in the removal of tidal brackish emergent wetland. All of this construction and land
 16 modification activity that could affect tidal brackish emergent wetland would take place in Suisun
 17 Marsh (CZ 11). The acreage of loss has not been calculated because the specific locations for site
 18 preparation and earthwork have not been identified, but the loss would likely be very small (less
 19 than 1 acre). These activities would occur in small increments during the course of the CM4
 20 restoration program. The restoration elements of CM4 would greatly exceed any of the short-term
 21 losses described above. At least 6,000 acres of tidal brackish emergent wetland would be restored in
 22 the Plan Area (BDCP Objective TBEWNC1.1, associated with CM4), with 2,000 acres of restoration
 23 occurring in the near-term timeframe. In addition, the habitat and ecosystem functions of BDCP
 24 restored tidal brackish emergent wetland would be maintained and enhanced (CM11). The BDCP

1 beneficial effects evaluation of Alternative 4 (see BDCP Chapter 5, Section 5.4.3.2, *Beneficial Effects*
2 *of the Draft BDCP*) states that at least 6,000 acres of tidal brackish emergent wetland community
3 would be restored in CZ 11, and that tidal natural communities restoration would decrease habitat
4 fragmentation by providing additional connectivity between isolated patches of tidal brackish
5 emergent wetland.

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

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

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

40 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from** 41 **Ongoing Operation, Maintenance and Management Activities**

42 Once the physical facilities associated with CM1 and CM4 of Alternative 4 are constructed and the
43 water management practices associated with changed reservoir operations, diversions from the
44 north Delta, and marsh restoration are in effect, there would be new ongoing and periodic actions

1 that could affect tidal brackish emergent wetland natural community in the study area. The ongoing
2 actions include water releases and diversions, access road and levee repair, and replacement of
3 levee armoring, channel dredging, and habitat enhancement in accordance with natural community
4 management plans. The potential effects of these actions are described below.

- 5 • *Modified river flows upstream of and within the study area and reduced diversions from south*
6 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
7 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
8 channels (associated with Operational Scenario H) would not result in the permanent reduction
9 in acreage of tidal brackish emergent wetland natural community in the study area. Flow levels
10 in the upstream rivers would not directly affect this natural community because it does not exist
11 upstream of the Delta. Increased diversions of Sacramento River flows in the north Delta would
12 not result in a permanent reduction in tidal brackish emergent wetland downstream of these
13 diversions. Salinity levels in Suisun Marsh channels would be expected to increase with reduced
14 Sacramento River outflows (see Chapter 8, Section 8.34.3.9, [Alternative 4, of the Draft EIR/EIS](#)),
15 but this change would not be sufficient to change the acreage of brackish marsh. This natural
16 community persists in an environment that experiences natural fluctuations in salinity due to
17 tidal ebb and flow. Reduced diversions from the south Delta channels would not create a
18 reduction in this natural community.

19 The increased diversion of Sacramento River flows in the north Delta would result in reductions
20 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
21 reduction is estimated to be approximately 9% of the river's current sediment load for
22 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational
23 Scenario H (see [BDCP-Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3, Summary of Changes to](#)
24 [Sediment Supply in the Plan Area due to BDCP Shift in Export Location and Volume, of the Draft](#)
25 [BDCP](#) for a detailed analysis of this issue). This would contribute to a decline in sediment
26 reaching the Delta and Suisun Marsh that has been occurring over the past 50-plus years due to
27 a gradual depletion of sediment from the upstream rivers. The depletion has been caused by a
28 variety of factors, including depletion of hydraulic mining sediment in upstream areas, armoring
29 of river channels and a cutoff of sediment due to dam construction on the Sacramento River and
30 its major tributaries (Wright and Schoellhamer 2004; Barnard et al. 2013).

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

1 special-status marsh community. The effect would not be adverse (NEPA) and would be less
2 than significant (CEQA).

- 3 • *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP
4 actions have the potential to require removal of adjacent vegetation and could entail earth and
5 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil
6 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal
7 erosion, turbidity and runoff control management practices, including those developed as part
8 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
9 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
10 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
11 of disturbed surfaces. Proper implementation of these measures would avoid permanent
12 adverse effects on this community.
- 13 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
14 treatment (CM11), would be a periodic activity associated with the long-term maintenance of
15 restoration sites. Use of herbicides to control nuisance vegetation could pose a long-term hazard
16 to tidal brackish emergent wetland natural community at or adjacent to treated areas. The
17 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
18 stormwater onto the natural community, or direct discharge of herbicides to wetland areas
19 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, ~~are described in Appendix~~
25 ~~3B, Environmental Commitments, of the Draft EIR/EIS.~~ Best management practices, including
26 control of drift and runoff from treated areas, and use of herbicides approved for use in aquatic
27 environments would also reduce the risk of affecting natural communities adjacent to levees
28 associated with tidal wetland restoration activities.
- 29 • *Channel dredging.* Long-term maintenance of tidal channels that support wetland expansion in
30 Suisun Marsh would include periodic dredging of sediments. The dredging would occur adjacent
31 to tidal brackish emergent wetland natural community and would result in short-term increases
32 in turbidity and disturbance of the substrate. These conditions would not eliminate the
33 community, but would diminish its value in the short term for special-status and common
34 species that rely on it for cover, movement corridor or foraging area. The individual species
35 effects are discussed later in this chapter.
- 36 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
37 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural
38 community, a management plan would be prepared that specifies actions to improve the value
39 of the habitats for covered species. Actions would include control of invasive nonnative plant
40 and animal species, fire management, restrictions on vector control and application of
41 herbicides, and maintenance of infrastructure that would allow for movement through the
42 community. The enhancement efforts would improve the long-term value of this community for
43 both special-status and common species.

44 The various operations and maintenance activities described above could alter acreage and value of
45 tidal brackish emergent wetland natural community in the study area through water operations,

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

12 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
13 Alternative 4 would not result in a net permanent reduction in the tidal brackish emergent wetland
14 natural community within the study area. There would be no adverse effect on the tidal brackish
15 emergent wetland natural community.

16 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
17 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish
18 emergent wetland natural community in the study area, and could create temporary increases in
19 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
20 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
21 AMM5 would minimize these impacts, and other operations and maintenance activities, including
22 management, protection and enhancement actions associated with *CM3 Natural Communities*
23 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
24 create positive effects, including improved water movement in these habitats. Long-term restoration
25 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand this
26 natural community in the study area. Ongoing operation, maintenance and management activities
27 would not result in a net permanent reduction in this sensitive natural community within the study
28 area. Therefore, there would be a less-than-significant impact.

29 **Tidal Freshwater Emergent Wetland**

30 Construction, operation, maintenance and management associated with the conservation
31 components of Alternative 4 would have no long-term adverse effects on the habitats associated
32 with the tidal freshwater emergent wetland natural community. Initial development and
33 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
34 removal of small acreages of this community. (see Table 12-4-3). Full implementation of Alternative
35 4 would also include the following conservation actions over the term of the BDCP to benefit the
36 tidal freshwater emergent wetland natural community.

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

- 1 • Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of
2 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6 and/or 7 (Objective
3 TFEWNC1.1, associated with CM4).
- 4 • Restore tidal freshwater emergent wetlands in areas that increase connectivity among
5 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 6 • Restore and sustain a diversity of marsh vegetation that reflects historical species compositions
7 and high structural complexity (Objective TFEWNC2.1, associated with CM4).
- 8 • Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide
9 variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2,
10 associated with CM4).

11 There is a variety of other, less specific conservation goals and objectives in ~~BDCP~~ Chapter 3, Section
12 3.3, *Biological Goals and Objectives, of the Draft BDCP* that would improve the value of tidal
13 freshwater emergent wetland natural community for terrestrial species. As explained below, with
14 the restoration and enhancement of these amounts of habitat, in addition to implementation of
15 AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be
16 less than significant for CEQA purposes.

17 **Table 12-4-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated with**
18 **Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	63	63	1015	1015	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
TOTAL IMPACTS	1310	1411	1015	1116	24-58	3

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

Unk. = unknown

19

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

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

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.

- 23 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities
24 would permanently remove ~~6-3~~ acres and temporarily remove ~~10-15~~ acres of tidal freshwater
25 emergent wetland community. Most of the loss would occur along rivers and canals in the
26 central Delta from barge unloading facility construction (Old River on the ~~northwest corner~~
27 ~~east side of Woodward-Victoria~~ Island and Connection Slough at the north end of ~~Mandeville~~
28 ~~Bacon~~ Island), and from transmission line construction (San Joaquin River and Potato Slough at the
29 south and north ends of Venice Island, Connection Slough at the north end of Bacon Island, and
30 Railroad Slough at the north end of Woodward Island; see Terrestrial Biology Mapbook in
31 Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS). These losses would
32 take place during the near-term construction period.

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

- 40 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
41 construction or channel modification activities within the Yolo and Sacramento Bypasses,
42 including improvements in flow through the west side channel of the bypass, Putah Creek
43 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of
44 these activities could involve excavation and grading in tidal freshwater emergent wetland areas
45 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,

1 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur in
2 the ~~first 10 years~~near-term time period of Alternative 4 implementation.

- 3 • *CM4 Tidal Natural Communities Restoration*: Based on hypothetical footprints of this restoration
4 activity, initial land grading and levee modification could permanently remove 1 acre of tidal
5 freshwater emergent wetland natural community. This loss would occur in the near-term
6 timeframe and would occur throughout the ROAs identified for tidal wetland restoration. At the
7 same time, an estimated 24,000 acres of tidal freshwater emergent wetland community would
8 be restored during tidal habitat restoration, consistent with Objective TFEWNC1.1, (associated
9 with CM4). Approximately 8,850 acres of the restoration would happen during the first 10 years
10 of Alternative 4 implementation, which would coincide with the timeframe of water conveyance
11 facilities construction. The remaining restoration would be spread over the following 30 years.
12 Tidal wetland communities restoration is expected to be focused in the ROAs identified in Figure
13 12-1. Restoration would be located and designed to improve habitat connectivity (Objective
14 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in
15 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would be
16 implemented in the lower Yolo Bypass, but restoration would also be spread among the Suisun
17 Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

18 The restoration activities associated with CM4 in the Plan Area ROAs would result in other
19 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances
20 associated with levee breaching and grading or contouring would increase opportunities for the
21 introduction or spread of invasive species. Implementation of CM11 would limit this risk
22 through invasive species control and wetland management and enhancement activities to
23 support native species. Flooding of dry areas for tidal freshwater marsh creation could also
24 increase the bioavailability of methylmercury, especially in the Cache Slough,
25 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the
26 significance of this hazard to marsh vegetation and associated wildlife. A detailed review of the
27 methylmercury issues associated with implementation of the BDCP are is contained in Appendix
28 D, Substantive BDCP Revisions, of this RDEIR/SDEIS Appendix D. Because of the difficulty in
29 assessing this risk at a programmatic level, it will need to be considered at a project level. Site-
30 specific restoration plans that address the creation and mobilization of mercury, and monitoring
31 and adaptive management as described in *CM12 Methylmercury Management*, would be
32 available to address the uncertainty of methylmercury levels in restored tidal marsh. Water
33 temperature fluctuations in newly created marsh is also an issue of concern that is difficult to
34 quantify at the current stage of restoration design. None of these effects is expected to limit the
35 extent or value of tidal freshwater emergent wetland in the study area.

- 36 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
37 would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater emergent
38 wetland habitat. The construction-related losses would be considered a permanent removal of
39 the habitats directly affected. The majority of seasonally inundated floodplain restoration is
40 expected to occur along the lower San Joaquin River in the south and central Delta areas.
41 Floodplain restoration along the San Joaquin River would improve connectivity for a variety of
42 species that rely on freshwater marsh and riparian habitats. The regional and Plan Area
43 landscape linkages along the San Joaquin River are included in Figure 12-2. This activity is
44 scheduled to start following construction of water conveyance facilities, ~~which is expected to~~
45 ~~take 10 years.~~

- *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the enhancement activity would occur on narrow strips of habitat, including levees and channel banks. The improvements would occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

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

Near-Term Timeframe

During the near-term timeframe ~~(the first 10 years of BDCP implementation)~~, Alternative 4 would affect the tidal freshwater emergent wetland natural community through CM1 construction losses (~~6~~ 3 acres permanent and ~~10-15~~ acres temporary), CM2 construction losses (6 acres permanent), and CM4 construction losses (1 acre permanent). These losses would occur in the central Delta from construction of barge unloading facilities and transmission lines on the fringes of Venice, Bacon and Woodward Islands, and in various locations within the Yolo Bypass and the tidal restoration ROAs.

The construction losses of this special-status natural community would represent an adverse effect if they were not offset by avoidance and minimization measures and restoration actions associated with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater emergent wetland natural community as part of CM4 during the first 10 years of Alternative 4 implementation would more than offset this near-term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration) would indicate that ~~23-25~~ acres of restoration would be needed to offset (i.e., mitigate) the ~~23-25~~ acres of loss (the total permanent and temporary near-term effects listed in Table 12-4-3).

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~BDCP Appendix 3.C.~~

Late Long-Term Timeframe

Implementation of Alternative 4 as a whole would result in relatively minor (less than 1%) losses of tidal freshwater emergent wetland community in the study area. These losses (~~14-11~~ acres of permanent and ~~11-16~~ acres of temporary loss) would be largely associated with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee modification and land grading associated with tidal marsh restoration (CM4) and floodplain restoration (CM5). The CM4 and CM5 losses would occur during the course of conservation actions at various tidal and floodplain restoration sites throughout the study area. By the end of the Plan timeframe, a total of 24,000 acres of this natural community would be restored. The restoration

1 would occur over a wide region of the study area, including within the Suisun Marsh,
2 Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure 12-1).

3 **NEPA Effects:** The creation of 8,850 acres of tidal freshwater emergent wetland natural community
4 as part of CM4 during ~~the first 10 years~~near-term of Alternative 4 implementation would more than
5 offset the construction and inundation-related effects of implementing CM1, CM2, CM4 and CM5,
6 avoiding any adverse effect in the near-term. Because of the 24,000 acres of tidal freshwater
7 emergent wetland restoration that would occur over the course of the Plan, Alternative 4 would not
8 result in a net long-term reduction in the acreage of a sensitive natural community; the effect would
9 be beneficial.

10 **CEQA Conclusion:**

11 **Near-Term Timeframe**

12 Alternative 4 would result in the loss of approximately ~~23-25~~ acres of tidal freshwater emergent
13 wetland natural community (permanent and temporary) due to construction of the water
14 conveyance facilities (CM1) and fish passage improvements (CM2), and tidal marsh restoration
15 (CM4). The construction losses would occur in primarily in the central Delta on the fringes of Venice,
16 Bacon and Victoria Islands, and in the Yolo Bypass and various tidal restoration ROAs. The losses
17 would be spread across ~~a 10 year~~the near-term timeframe and would be offset by planned
18 restoration of 8,850 acres of tidal freshwater emergent wetland natural community scheduled for
19 the first 10 years of Alternative 4 implementation (CM4). AMM1, AMM2, AMM6, AMM7 and AMM10
20 would also be implemented to minimize impacts. Because of these offsetting near-term restoration
21 activities and AMMs, impacts would be less than significant and no mitigation would be required.
22 Typical project-level mitigation ratios (1:1 for restoration) would indicate that ~~23-25~~ acres of
23 restoration would be needed to offset (i.e., mitigate) the ~~23-25~~ acres of loss. The restoration would
24 be initiated at the beginning of Alternative 4 implementation to minimize any time lag in the
25 availability of this habitat to special-status species~~s~~, and would result in a net gain in acreage of this
26 sensitive natural community.

27 **Late Long-Term Timeframe**

28 At the end of the Plan period, ~~25-27~~ acres of this community would be lost to conservation activities
29 and 24,000 acres of this community would be restored. There would be no net permanent reduction
30 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 4
31 would not have a substantial adverse effect on this natural community; the impact on the tidal
32 freshwater emergent wetland natural community would be beneficial.

33 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 34 **Freshwater Emergent Wetland Natural Community**

35 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
36 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
37 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
38 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would
39 expose this community to additional flooding as channel margins are modified and levees are set
40 back to improve fish habitat along some of the major rivers and waterways throughout the study
41 area.

- 1 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
2 result in an increase in the frequency, magnitude and duration of inundation of 24–58 acres of
3 tidal freshwater emergent wetland natural community. The methods used to estimate these
4 inundation acreages are described in ~~BDCP~~-Appendix 5.J, *Effects on Natural Communities,*
5 *Wildlife, and Plants, of the Draft BDCP*. The area more frequently inundated would vary with the
6 flow volume that would pass through the newly constructed notch in the Fremont Weir. The 24-
7 acre increase in inundation would be associated with a notch flow of 1,000 cubic feet per second
8 (cfs), and the 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related
9 increases in flow through Fremont Weir would be expected in 30% of the years. Most of this
10 community occurs in the southern section of the bypass on Liberty Island, on the fringes of tidal
11 perennial aquatic habitats. Smaller areas are scattered among the cropland within the bypass,
12 south of Interstate 80. The anticipated change in management of flows in the Yolo Bypass
13 includes more frequent releases in flows into the bypass from the Fremont and Sacramento
14 Weirs, and in some years, later releases into the bypass in spring months (April and May). The
15 modification of periodic inundation events would not adversely affect the ecological function of
16 tidal freshwater emergent wetland habitats and would not substantially modify its value for
17 special-status or common terrestrial species. The plants in this natural community are adapted
18 to periodic inundation events within the Yolo Bypass. The effects of this inundation on wildlife
19 and plant species are described in detail in later sections of this chapter.
- 20 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
21 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater
22 emergent wetland habitats. Specific locations for this restoration activity have not been
23 identified, but they would likely be focused in the south Delta area, along the major rivers and
24 Delta channels. The reconnection of these wetlands to stream flooding events would be
25 beneficial to their ecological function, especially as they relate to BDCP target terrestrial and
26 aquatic species. Foraging activity and refuge sites would be expanded into areas currently
27 unavailable or infrequently available to some aquatic species.

28 In summary, 27-618 acres of tidal freshwater emergent wetland natural community in the study
29 area would be subjected to more frequent inundation as a result of implementing two Alternative 4
30 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a
31 habitat of great value to both terrestrial and aquatic species in the study area, and increases in
32 inundation for relatively short periods of time would not reduce the acreage or the value of this
33 community.

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

37 **CEQA Conclusion:** An estimated 27–61 acres of tidal freshwater emergent wetland natural
38 community in the study area would be subjected to more frequent inundation as a result of
39 implementing CM2 and CM5 under Alternative 4. This community is of great value to aquatic and
40 terrestrial species in the study area. The periodic inundation would not result in a net permanent
41 reduction in the acreage or value of this community in the study area. Therefore, there would be a
42 less-than-significant impact on the tidal freshwater emergent wetland natural community.

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

3 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
4 associated with changed water management is in effect, there would be new ongoing and periodic
5 actions associated with operation, maintenance and management of the BDCP facilities and
6 conservation lands that could affect tidal freshwater emergent wetland natural community in the
7 study area. The ongoing actions would include modified operation of upstream reservoirs, the
8 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
9 channels. These actions are associated with CM1 (see Impact BIO-7 for effects associated with CM2).
10 The periodic actions would involve access road and conveyance facility repair, vegetation
11 management at the various water conveyance facilities and habitat restoration sites (CM11), levee
12 repair and replacement of levee armoring, channel dredging, and habitat enhancement in
13 accordance with natural community management plans. The potential effects of these actions are
14 described below.

- 15 • *Modified river flows upstream of and within the study area and reduced diversions from south*
16 *Delta channels.* Reduced diversions from the south Delta channels would not create a reduction
17 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows
18 in the Sacramento River, Feather River, and American River associated with modified reservoir
19 operations, and the increased diversion of Sacramento River flows at north Delta intakes
20 associated with Alternative 4 (Operational Scenario H) would affect salinity, water temperature,
21 dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in these rivers and
22 Delta waterways. These changes are discussed in detail in Chapter 8, *Water Quality, of the Draft*
23 *EIR/EIS*. Potentially substantial increases in electrical conductivity (salinity) are predicted for
24 the west Delta and Suisun Marsh as a result of these changed water operations. These salinity
25 changes may alter the plant composition of tidal freshwater emergent wetland along the lower
26 Sacramento and San Joaquin Rivers and west Delta islands. The severity and extent of these
27 salinity changes would be complicated by anticipated sea level rise and the effects of
28 downstream tidal restoration over the life of the Plan. There is the potential that some tidal
29 freshwater marsh may become brackish. These potential changes are not expected to result in a
30 significant reduction in the acreage and value of tidal freshwater emergent wetland natural
31 community in the study area.

32 The increased diversion of Sacramento River flows in the north Delta would result in reductions
33 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
34 reduction is estimated to be approximately 9% of the river's current sediment load for
35 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational
36 Scenario H (see *BDCP-Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3, Summary of Changes to*
37 *Sediment Supply in the Plan Area due to BDCP Shift in Export Location and Volume, in the Draft*
38 *BDCP*, for a detailed analysis of this issue). This would contribute to a decline in sediment
39 reaching the Delta and Suisun Marsh that has been occurring over the past 50-plus years due to
40 a gradual depletion of sediment from the upstream rivers. The depletion has been caused by a
41 variety of factors, including depletion of hydraulic mining sediment in upstream areas, armoring
42 of river channels and a cutoff of sediment due to dam construction on the Sacramento River and
43 its major tributaries (Wright and Schoellhamer 2004; Barnard et al. 2013).

44 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
45 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh
46 vegetation allows the emergent plants to maintain an appropriate water depth as water levels

1 gradually rise from the effects of global warming (see Chapter 29, *Climate Change, of the Draft*
2 *EIR/EIS*). The BDCP proponents have incorporated an environmental commitment (see
3 Appendix 3B, Section 3B.1.19, *Disposal and Reuse of Spoil, Reusable Tunnel Material and Dredged*
4 *Material, of the Draft EIR/EIS*) into the project that would lessen this potential effect. The
5 Sacramento River water diverted at north Delta intakes would pass through sedimentation
6 basins before being ~~discharged~~~~pumped~~ to water conveyance structures. The commitment states
7 that sediment collected in these basins would be periodically removed and reused, to the
8 greatest extent feasible, in the Plan Area for a number of purposes, including marsh restoration,
9 levee maintenance, subsidence reversal, flood response, and borrow area fill. The portion of the
10 sediment re-introduced to the Delta and estuary for marsh restoration would remain available
11 for marsh accretion. With this commitment to reuse in the Plan Area, the removal of sediment at
12 the north Delta intakes would not result in a net reduction in the acreage and value of this
13 special-status marsh community. The effect would not be adverse (NEPA) and would be less
14 than significant (CEQA).

- 15 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
16 conveyance facilities and levees associated with the BDCP actions have the potential to require
17 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal
18 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,
19 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal
20 erosion, turbidity and runoff control management practices, including those developed as part
21 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
22 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent
23 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and
24 revegetation of disturbed surfaces. Proper implementation of these measures would avoid
25 permanent adverse effects on this community.
- 26 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
27 treatment, would be a periodic activity associated with the long-term maintenance of water
28 conveyance facilities and restoration sites (CM11). Use of herbicides to control nuisance
29 vegetation could pose a long-term hazard to tidal freshwater emergent wetland natural
30 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
31 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
32 direct discharge of herbicides to tidal aquatic areas being treated for invasive species removal.
33 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
34 have been made part of the BDCP to reduce hazards to humans and the environment from use of
35 various chemicals during maintenance activities, including the use of herbicides. These
36 commitments ~~are described in Appendix 3B~~, including the commitment to prepare and
37 implement spill prevention, containment, and countermeasure plans and stormwater pollution
38 prevention plans, ~~are described in Appendix 3B, Environmental Commitments, of the Draft~~
39 *EIR/EIS*. Best management practices, including control of drift and runoff from treated areas,
40 and use of herbicides approved for use in aquatic environments would also reduce the risk of
41 affecting natural communities adjacent to water conveyance features and levees associated with
42 restoration activities.
- 43 ● *Channel dredging.* Long-term operation of the Alternative 4 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 waterways adjacent to tidal freshwater emergent wetlands and
46 would result in short-term increases in turbidity and disturbance of the substrate. These

1 conditions would not eliminate the community, but would diminish its value for special-status
2 and common species that rely on it for cover 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 freshwater emergent wetland 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, fire management, restrictions on vector control and application of herbicides, and
9 maintenance of infrastructure that would allow for movement through the community. The
10 enhancement efforts would improve the long-term value of this community for both special-
11 status and common species.

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

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

27 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4, including
28 changed water operations in the upstream rivers, would have the potential to create minor changes
29 in total acreage of tidal freshwater emergent wetland natural community in the study area, and
30 could create temporary increases in turbidity and sedimentation. The activities could also introduce
31 herbicides periodically to control nonnative, invasive plants. Implementation of environmental
32 commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and other operations
33 and maintenance activities, including management, protection and enhancement actions associated
34 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
35 *Enhancement and Management*, would create positive effects, including improved water movement
36 in these habitats. Long-term restoration activities associated with *CM4 Tidal Natural Communities*
37 *Restoration* would greatly expand this natural community in the study area. Ongoing operation,
38 maintenance and management activities would not result in a net permanent reduction in this
39 sensitive natural community within the study area. Therefore, there would be a less-than-significant
40 impact on the tidal freshwater emergent wetland natural community.

41 **Valley/Foothill Riparian**

42 Construction, operation, maintenance and management associated with the conservation
43 components of Alternative 4 would have no long-term adverse effects on the habitats associated
44 with the valley/foothill riparian natural community. Initial development and construction of CM1,

1 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
2 community(see Table 12-4-4). Full implementation of Alternative 4 would also include the following
3 conservation actions over the term of the BDCP to benefit the valley/foothill riparian natural
4 community.

- 5 • Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
6 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
7 with CM7).
- 8 • Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7
9 by year 10 (Objective VFRNC1.2, associated with CM3).
- 10 • Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
11 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
12 with CM5 and CM7).
- 13 • Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,
14 associated with CM3 and CM7).
- 15 • Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-
16 to late-successional riparian vegetation (VFRNC2.2,) in large blocks with a minimum patch size
17 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and
18 CM7).
- 19 • Maintain or increase abundance and distribution of valley/foothill riparian natural community
20 vegetation alliances that are rare or uncommon as recognized by California Department of Fish
21 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance
22 (Objective VFRNC3.1).

23 There is a variety of other, less specific conservation goals and objectives in ~~BDCP~~ Chapter 3, Section
24 3.3, *Biological Goals and Objectives, of the Draft BDCP* that would improve the value of valley/foothill
25 riparian natural community for terrestrial species. As explained below, with the restoration and
26 enhancement of these amounts of habitat, in addition to implementation of AMMs, impacts on this
27 natural community would not be adverse for NEPA purposes and would be less than significant for
28 CEQA purposes.

1 **Table 12-4-4. Changes in Valley/Foothill Riparian Natural Community Associated with Alternative**
2 **4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	3442	3442	3031	3031	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
TOTAL IMPACTS	421429	718726	118119	153154	51-92	266

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

Unk. = unknown

3

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

6 Construction, land grading and habitat restoration activities that would accompany the
7 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated ~~718~~
8 ~~726~~ acres and temporarily remove ~~153-154~~ acres of valley/foothill riparian natural community in
9 the study area. These modifications represent approximately 5% of the 17,966 acres of the
10 community that is mapped in the study area. The majority of the permanent and temporary losses
11 would happen during the ~~first 10 years near-term time period~~ of Alternative 4 implementation, as
12 water conveyance facilities are constructed and habitat restoration is initiated. Valley/foothill
13 riparian protection (750 acres) and restoration (800 acres) would be initiated during the same
14 period, which would begin to offset the losses. By the end of the Plan period, 5,000 acres of this
15 natural community would be restored. The ~~BDCP-beneficial-effects~~ analysis in (BDCP Chapter 5,
16 Section 5.4.5.2, *Beneficial Effects, of the Draft BDCP*) indicates that implementation of Alternative 4
17 would restore or create 5,000 acres of riparian forest and scrub in Conservation Zones 1, 2, 4, 5, 6,
18 and 7, with at least 3,000 acres occurring on restored seasonally inundated floodplain. Alternative 4
19 would also protect 750 acres of existing valley/foothill riparian natural community in Conservation
20 Zone 7.

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 4 water conveyance facilities
2 would permanently remove 34-42 acres and temporarily remove 30-31 acres of valley/foothill
3 riparian natural community. The permanent losses would occur where Intakes 2, 3, and 5
4 encroach on the Sacramento River's east bank between Freeport and Courtland. The riparian
5 areas here are very small patches, some dominated by valley oak and others by nonnative trees
6 (acacia) and scrub vegetation (see Terrestrial Biology Mapbook in Appendix A, Draft EIR/EIS In-
7 Text Chapter Revisions, of this RDEIR/SDEIS). Cottonwood, willow and mixed brambles would be
8 permanently lost at the ponds created by excavation for the peripheral canal both north and
9 south of Twin Cities Road just west of Interstate 5, as these sites would be used to deposit
10 reusable tunnel material. Some cottonwood and valley oak riparian would be lost due to
11 construction of a permanent access road from the new forebay west to a reusable tunnel
12 material disposal area. ~~Willow and Blackberry~~ brambles would also be lost to deposit of reusable
13 tunnel material at the ~~west-east~~ end of Bouldin Island. Smaller areas dominated by blackberry
14 would be eliminated at the forebay site adjacent to Clifton Court Forebay and patches of willow
15 and blackberry would be lost along the transmission line corridors where they cross waterways
16 in the central and south Delta. ~~Temporary-Permanent~~ losses would occur where pipelines the
17 realigned Highway 160 would cross Snodgrass Slough ~~and other small waterways east of the~~
18 ~~Sacramento River, where temporary work areas surround intake sites,~~ and along Lambert Road
19 where permanent utility lines would be installed. Temporary losses would also occur adjacent
20 to temporary intake work areas. The riparian habitat in these areas is also composed of very
21 small patches or stringers bordering waterways, which are composed of valley oak, cottonwood,
22 willow and scrub vegetation. These losses would take place during the near-term construction
23 period.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
25 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
26 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
27 Sacramento Weir improvements. All of these activities could involve excavation and grading in
28 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on
29 hypothetical construction footprints, a total of 89 acres could be permanently lost and another
30 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end
31 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of
32 valley oak, cottonwood, sycamore and willow trees. The riparian areas here are primarily small,
33 disconnected patches with moderate to low value as wildlife movement corridors. Most of these
34 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and
35 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would
36 occur primarily in the near-term timeframe.
- 37 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
38 footprints, implementation of CM4 would permanently inundate or remove 552 acres of
39 valley/foothill riparian community. The losses would be spread among most of the ROAs
40 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh
41 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,
42 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation
43 dominated by blackberry. These areas are considered of low to moderate habitat value (~~BDCP~~
44 see Chapter 5, Section 5.4.5.1.1, Permanent Loss and Fragmentation, of the Draft BDCP). The
45 actual loss of riparian habitat to marsh restoration would be expected to be smaller than
46 predicted by use of the theoretical footprint. As marsh restoration projects were identified and
47 planned, sites could be selected that avoid riparian areas as much as possible.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration levee construction
2 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill
3 riparian natural community. The construction-related losses would be considered a permanent
4 removal of the habitats directly affected. These losses would be expected to occur along the San
5 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to
6 start following construction of water conveyance facilities, ~~which is expected to take 10 years.~~
- 7 • *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in
8 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
9 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
10 activity would occur along waterway margins where riparian habitat stringers exist, including
11 levees and channel banks. The improvements would occur within the study area on sections of
12 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 13 • *CM7 Riparian Natural Community Restoration:* The valley/foothill riparian natural community
14 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)
15 restoration and channel margin enhancements. Following community-specific goals and
16 objectives in the Plan, a total of 5,000 acres of this community would be restored (Objective
17 VFRNC1.1) and 750 acres would be protected (Objective VFRNC1.2) over the life of the Plan.
18 Approximately 800 acres would be restored and the entire 750 acres would be protected in the
19 first 10 years of Plan implementation. Riparian restoration and protection would be focused in
20 CZ 4 and CZ 7 (Objective VFRNC2.3), with a goal of adding a 500-acre portion of the restoration
21 in one or the other of these zones. A variety of successional stages would also be sought to
22 benefit the variety of sensitive plant and animal species that rely on this natural community in
23 the study area (Objective VFRNC2.4).

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 During the near-term timeframe ~~(the first 10 years of BDCP implementation)~~, Alternative 4 would
29 affect the valley/foothill riparian natural community through CM1 construction losses (~~34-42~~ acres
30 permanent and ~~30-31~~ acres temporary) and the CM2 construction losses (89 acres permanent and
31 88 acres temporary). These losses would occur along the eastern bank of the Sacramento River at
32 intake sites; along transmission lines in the central and south Delta and along Lambert Road; at
33 reusable tunnel material storage sites near Twin Cities Road, Clifton Court Forebay, and on Bouldin
34 Island; and in the northern Yolo Bypass. Approximately 298 acres of the inundation and
35 construction-related loss from CM4 would occur in the near-term. These losses would occur
36 throughout the ROAs mapped in Figure 12-1.

37 The construction losses of this special-status natural community would represent an adverse effect
38 if they were not offset by avoidance and minimization measures and protection/restoration actions
39 associated with BDCP conservation components. Loss of valley/foothill riparian natural community
40 would be considered a loss in acreage of a sensitive natural community, and could be considered a
41 loss of wetlands as defined in Section 404 of the CWA. As indicated above, most of the losses would
42 be in small patches or narrow strips along waterways, with limited structural complexity. However,
43 the restoration of 800 acres and protection (including significant enhancement) of 750 acres of
44 valley/foothill riparian natural community as part of CM7 and CM3 during the first 10 years of

1 Alternative 4 implementation would minimize this near-term loss, avoiding any adverse effect. At
2 least 400 acres of the protection is planned for the first 5 years of Alternative 4 implementation. The
3 restoration areas would be large areas providing connectivity with existing riparian habitats and
4 would include a variety of trees and shrubs to produce structural complexity. Typical project-level
5 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 539-548 acres of
6 protection and 539-548 acres of restoration would be needed to offset (i.e., mitigate) the 539-548
7 acres of loss (the combination of permanent and temporary losses in the near-term listed in Table
8 12-4-4). The combination of the two approaches (protection and restoration) are designed to avoid
9 a temporal lag in the value of riparian habitat available to sensitive species.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,
12 *Reusable Tunnel Material*, and *Dredged Material*, *AMM10 Restoration of Temporarily Affected Natural*
13 *Communities*, and *AMM18 Swainson's Hawk and White-Tailed Kite*. All of these AMMs include
14 elements that avoid or minimize the risk of affecting habitats at work areas and storage sites. The
15 AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft](#)
16 [BDCP, and an updated version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of](#)
17 [this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

18 **Late Long-Term Timeframe**

19 Implementation of Alternative 4 as a whole would result in approximately 5% losses of
20 valley/foothill riparian natural community in the study area. These losses (748-726 acres of
21 permanent and 153-154 acres of temporary) would be largely associated with construction of the
22 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2),
23 inundation during tidal marsh restoration (CM4), and setback of levees during floodplain expansion
24 (CM5). Inundation losses would occur through the course of the BDCP restoration program at
25 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of
26 5,000 acres of this natural community would be restored and 750 acres would be protected (CM7
27 and CM3, respectively), primarily in CZ 4 and CZ 7 in the Cosumnes/Mokelumne and South Delta
28 ROAs (see Figure 12-1).

29 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of
30 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10
31 years of Alternative 4 implementation would minimize the near-term loss of this community,
32 avoiding any adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and
33 protection of 750 acres of valley/foothill riparian natural community during the course of the Plan,
34 Alternative 4 would not result in a net long-term reduction in the acreage of a sensitive natural
35 community; the effect would be beneficial.

36 **CEQA Conclusion:**

37 **Near-Term Timeframe**

38 Alternative 4 would result in the loss of approximately 539-548 acres of valley/foothill riparian
39 natural community due to construction of the water conveyance facilities (CM1) and fish passage
40 improvements (CM2), and inundation during tidal marsh restoration (CM4). The construction losses
41 would occur primarily along the Sacramento River at intake sites; along transmission corridors in
42 the central and south Delta and along Lambert Road; at reusable tunnel material storage sites on
43 Bouldin Island, Clifton Court Forebay and near Twin Cities Road; and within the northern section of

1 the Yolo Bypass, while inundation losses would occur at various tidal restoration sites throughout
2 the study area. The construction losses would be spread across a ~~10-year~~ near-term timeframe.
3 These losses would be minimized by planned restoration of 800 acres (CM7) and protection
4 (including significant enhancement) of 750 acres (CM3) of valley/foothill riparian natural
5 community scheduled for the first 10 years of Alternative 4 implementation. At least 400 acres of
6 the protection is planned for the first 5 years of Alternative 4 implementation. AMM1, AMM2, AMM6,
7 AMM7, AMM10, and AMM18 would also be implemented to minimize impacts. Because of these
8 near-term restoration and protection activities and AMMs, impacts would be less than significant.
9 Typical project-level mitigation ratios (1:1 for protection and 1:1 for restoration) would indicate
10 that ~~539-548~~ acres of protection and ~~539-548~~ acres of restoration would be needed to offset (i.e.,
11 mitigate) the ~~539-548~~ acres of loss. The combination of the two approaches (protection and
12 restoration) is designed to avoid a temporal lag in the value of riparian habitat available to sensitive
13 species. The restoration would be initiated at the beginning of Alternative 4 implementation to
14 minimize any time lag in the availability of this habitat to special-status species, and would result in
15 a net gain in acreage of this sensitive natural community.

16 **Late Long-Term Timeframe**

17 At the end of the Plan period, ~~871-880~~ 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 4 would not have a
21 substantial adverse effect on this natural community; the impact would be beneficial.

22 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 23 **Valley/Foothill Riparian Natural Community**

24 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
25 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
26 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
27 of valley/foothill riparian natural community at scattered locations, while CM5 would expose this
28 community to additional flooding as channel margins are modified and levees are set back to
29 improve fish habitat along some of the major rivers and waterways of the study area.

- 30 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
31 result in an increase in the frequency, magnitude and duration of inundation of 51–92 acres of
32 valley/foothill riparian natural community. The area more frequently inundated would vary
33 with the flows that would be passed through the newly constructed notch in the Fremont Weir.
34 The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by
35 a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages are described
36 in ~~BDCP~~ Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants, of the Draft BDCP*.
37 These increased flow conditions would be expected to occur in no more than 30% of all years
38 (~~see BDCP Chapter 5, Section 5.4.1.2~~). The valley/foothill riparian community occurs throughout
39 the bypass, including a large acreage just below Fremont Weir in the north end of the bypass.
40 There are other riparian habitat areas on Liberty Island, and, to a lesser extent, along the eastern
41 and western edges of the bypass, including along the Tule Canal/Toe Drain, the west side
42 channels and the Sacramento Bypass. The anticipated change in management of flows in the
43 Yolo Bypass includes more frequent releases in flows into the bypass from the Fremont and
44 Sacramento Weirs, and in some years, later releases into the bypass in spring months (April and

1 May). The modification of periodic inundation events would not adversely affect riparian
2 habitats, as they have persisted under similar high flows and extended inundation periods in the
3 Yolo Bypass. The effects of this inundation on wildlife and plant species are described in detail in
4 later sections of this chapter.

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

12 In summary, 317–368 acres of valley/foothill riparian community in the study area would be
13 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation
14 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits
15 from periodic inundation; therefore, periodic inundation would not result in a net permanent
16 reduction in the acreage of this community in the study area. The increased inundation could create
17 a beneficial effect on the community as it relates to germination and establishment of native riparian
18 plants.

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

21 **CEQA Conclusion:** An estimated 317–368 acres of valley/foothill riparian community in the study
22 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
23 under Alternative 4. The valley/foothill riparian community is conditioned to and benefits from
24 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in
25 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill
26 riparian natural community in the Yolo Bypass and along south Delta waterways would have a
27 beneficial impact on the community.

28 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 29 **Operation, Maintenance and Management Activities**

30 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
31 associated with changed water management is in effect, there would be new ongoing and periodic
32 actions associated with operation, maintenance and management of the BDCP facilities and
33 conservation lands that could affect valley/foothill riparian natural community in the study area.
34 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
35 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of
36 reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-10 for effects
37 associated with CM2). The periodic actions would involve access road and conveyance facility
38 repair, vegetation management at the various water conveyance facilities and habitat restoration
39 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
40 enhancement in accordance with natural community management plans. The potential effects of
41 these actions are described below.

- 42 • *Modified releases and water levels in upstream reservoirs*. Modified releases and water levels at
43 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect

1 valley/foothill riparian natural community. The anticipated water levels over time with
2 Alternative 4, as compared to no action, would be slightly lower in the October to May
3 timeframe. The small changes in frequency of higher water levels in these lakes would not
4 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of
5 the reservoir pools. Changes in releases that would influence downstream river flows are
6 discussed below.

- 7 • *Modified river flows upstream of and within the study area and reduced diversions from south*
8 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their
9 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with
10 Operational Scenario H) would not be expected to result in the permanent reduction in acreage
11 of valley/foothill riparian natural community along these waterways. There is no evidence that
12 flow levels in the upstream rivers would change such that the acreage of this community would
13 be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley
14 have historically been exposed to significant variations in river stage. Based on modeling
15 conducted for the BDCP (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*
16 *of the Draft EIR/EIS*), flow levels in these upstream rivers could be reduced by as much as 19%
17 in the July to November time frame when compared to No Action, while flow levels in the
18 February to May time frame could increase as much as 48% with implementation of Alternative
19 4. Similarly, increased diversions of Sacramento River flows in the north Delta would not be
20 expected to result in a permanent reduction in valley/foothill riparian community downstream
21 of these diversions, even though river flows are modeled to be reduced by 11–27% compared
22 with No Action, depending on month and water-year type (see *Section 11C.4 in Appendix 11C,*
23 *Section 11C.4, Alternative 4, in the Draft EIR/EIS*). Reduced diversions from the south Delta
24 channels would not create a reduction in this natural community.

25 The periodic changes in flows in the Sacramento River, Feather River, and American River
26 associated with modified reservoir operations, and the increased diversion of Sacramento River
27 flows at north Delta intakes associated with Alternative 4 would affect salinity, water
28 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in
29 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*
30 *Quality, of the Draft EIR/EIS*. Potentially substantial increases in electrical conductivity (salinity)
31 are predicted for the west Delta and Suisun Marsh as a result of these changed water operations.
32 These salinity changes may alter the plant composition of riparian habitats along the lower
33 Sacramento and San Joaquin Rivers and west Delta islands. The severity and extent of these
34 salinity changes would be complicated by anticipated sea level rise and the effects of
35 downstream tidal restoration over the life of the Plan. There is the potential that some
36 valley/foothill riparian natural community may be degraded immediately adjacent to river
37 channels. The riparian communities in the west Delta are dominated by willows, cottonwood
38 and mixed brambles. These potential changes are not expected to result in a significant
39 reduction in the acreage and value of valley/foothill riparian natural community in the study
40 area.

- 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 valley/foothill riparian
44 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these
45 habitats. These activities would be subject to normal erosion, turbidity and runoff control
46 management practices, including those developed as part of *AMM2 Construction Best*

1 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
2 vegetation removal or earthwork adjacent to or within riparian habitats would require use of
3 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*
4 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would
5 avoid permanent 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 water
8 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
9 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
10 valley/foothill riparian natural community at or adjacent to treated areas. The hazard could be
11 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
12 onto the natural community, or direct discharge of herbicides to riparian areas being treated for
13 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*
14 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and
15 the environment from use of various chemicals during maintenance activities, including the use
16 of herbicides. These commitments ~~are described in Appendix 3B~~, including the commitment to
17 prepare and implement spill prevention, containment, and countermeasure plans and
18 stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*
19 *Commitments, of the Draft EIR/EIS*. Best management practices, including control of drift and
20 runoff from treated areas, and use of herbicides approved for use in terrestrial environments
21 would also reduce the risk of affecting natural communities adjacent to water conveyance
22 features and levees associated with restoration activities.
- 23 • *Channel dredging*. Long-term operation of the Alternative 4 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 of the Draft BDCP and Appendix D, Section D.3.2.5
40 of this RDEIR/SDEIS) describes this program and identifies applicable restrictions on recreation
41 that might adversely affect riparian habitat. The BDCP also includes an avoidance and
42 minimization measure (AMM37) that further dictates limits on recreation activities that might
43 affect this natural community. Priority would be given to use of existing trails and roads, with
44 some potential for new trails. Limited tree removal and limb trimming 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 implementation of Alternative 4 would not result in a net permanent reduction in the valley/foothill
19 riparian natural community within the study area. Therefore, there would be no adverse effect on
20 this natural community.

21 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
22 have the potential to create minor changes in total acreage of valley/foothill riparian natural
23 community in the study area, and could create temporary increases in turbidity and sedimentation.
24 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
25 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, and AMM18
26 would minimize these impacts, and other operations and maintenance activities, including
27 management, protection and enhancement actions associated with *CM3 Natural Communities*
28 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
29 create positive effects, including reduced competition from invasive, nonnative plants in these
30 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural*
31 *Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this
32 natural community in the study area. Ongoing operation, maintenance and management activities
33 would not result in a net permanent reduction in this sensitive natural community within the study
34 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural
35 community.

36 **Nontidal Perennial Aquatic**

37 Construction, operation, maintenance and management associated with the conservation
38 components of Alternative 4 would have no long-term adverse effects on the habitats associated
39 with the nontidal perennial aquatic natural community. Initial development and construction of
40 CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
41 community(see Table 12-4-5). Full implementation of Alternative 4 would also include the following
42 conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic natural
43 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, *Biological Goals and Objectives, of the Draft BDCP* 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 12-4-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	5759	5759	710	710	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
TOTAL IMPACTS	115117	298300	1922	3538	50-77	25

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

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 ~~298-300~~ acres and temporarily remove ~~35-38~~ acres of nontidal perennial aquatic natural community in the study area. These modifications represent approximately 6% of the 5,567 acres of the community that is mapped in the study area. Approximately 45% (~~134-139~~ acres) of the permanent and temporary losses would occur during the ~~first 10 years near-term~~ of Alternative 4 implementation, as water conveyance facilities are constructed and habitat restoration is initiated. Natural communities restoration would add 400 acres (CM10) of nontidal marsh during the same period which would expand the area of

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

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 Operation*: Construction of the Alternative 4 water conveyance facilities
13 would permanently remove ~~57-59~~ acres and temporarily remove ~~7-10~~ acres of nontidal
14 perennial aquatic community. Most of the permanent loss would occur at ~~reusable tunnel~~
15 ~~material storage sites on southern Mandeville Island and in~~ the linear ponds associated with the
16 proposed peripheral canal north and south of Twin Cities Road just west of Interstate 5 ~~and a~~
17 ~~reusable tunnel material storage site on Bouldin Island~~ (see Terrestrial Biology Mapbook ~~in~~
18 ~~Appendix A, Draft EIR/EIS In-Text Chapter Revisions of this RDEIR/SDEIS~~). Most of the
19 temporary loss would occur where transmission line construction would cross Mandeville
20 Island. These wetlands are linear ponds or small, isolated areas surrounded by agricultural land.
21 These losses would take place during the near-term 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 modifications, Putah Creek realignment
25 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could
26 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish
27 through the bypass. Based on hypothetical construction footprints, a total of 24 acres could be
28 permanently lost and another 12 acres could be temporarily removed. This activity would occur
29 primarily in the near-term timeframe.
- 30 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
31 footprints, implementation of CM4 would permanently change to tidally influenced inundation
32 or remove 189 acres of nontidal perennial aquatic community. These losses would be expected
33 to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An
34 estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the
35 restoration (CM10) would happen during the first 10 years of Alternative 4 implementation,
36 which would coincide with the timeframe of water conveyance facilities construction and early
37 restoration activities. The remaining restoration would be spread over the following 30 years.
38 Nontidal natural communities restoration is expected to be focused in the CZs 2, 4 and/or 5 in
39 Figure 12-1.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain
41 restoration levee construction would permanently remove 28 acres and temporarily remove 16
42 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered
43 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain
44 restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration
45 along the southern Delta rivers would improve connectivity for a variety of species that rely on

1 aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San
2 Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled
3 to start following construction of water conveyance facilities, ~~which is expected to take 10 years.~~

- 4 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
5 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The
6 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
7 would occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.
8 Nontidal marsh adjacent to these tidal areas could be affected. The improvements would be
9 undertaken within the study area on sections of the Sacramento, San Joaquin and Mokelumne
10 Rivers, and along Steamboat and Sutter Sloughs.
- 11 ● *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
12 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
13 and nontidal freshwater perennial emergent natural communities. This marsh restoration
14 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
15 would be accompanied by adjacent grassland restoration or protection.

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 4 would
21 affect the nontidal perennial aquatic community through CM1 construction losses (~~57-59~~ acres
22 permanent and ~~7-10~~ acres temporary) and the CM2 construction losses (24 acres permanent and 12
23 acres temporary). These losses would occur primarily at linear ponds near Twin Cities Road, on
24 southern Bouldin Island, and along the transmission corridor as it crosses Mandeville Island.
25 Approximately 34 acres of the inundation and construction-related losses from CM4 would occur in
26 the near-term throughout several of 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 nontidal perennial aquatic natural community would
30 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the
31 United States as defined by Section 404 of the CWA. However, creating 400 acres of nontidal marsh
32 as part of CM10 during the first 10 years of Alternative 4 implementation would offset this near-
33 term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and
34 1:1 for protection) would indicate ~~134-139~~ acres of restoration and ~~134-139~~ acres of protection
35 would be needed to offset (i.e., mitigate) the ~~134-139~~ acres of loss. While the Plan does not include
36 protection of nontidal perennial aquatic habitat, it includes well in excess of the typical 1:1
37 restoration acreage (which includes protection in perpetuity), and therefore compensates for the
38 lack of protection.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)

1 [updated version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this](#)
2 [RDEIR/SDEISBDCP Appendix 3.C.](#)

3 **Late Long-Term Timeframe**

4 Implementation of Alternative 4 as a whole would result in relatively minor (6%) losses of nontidal
5 perennial aquatic community in the study area. These losses (~~298-300~~ acres of permanent and ~~35-38~~
6 acres of temporary loss) would be largely associated with construction of the water conveyance
7 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced
8 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The changes to
9 tidally influenced inundation would occur during the course of the CM4 restoration activities at
10 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of
11 1,200 acres of nontidal marsh would be restored. The restoration would occur over a wide region of
12 the study area, including within the Cosumnes/Mokelumne, Yolo Bypass, South Delta and East Delta
13 ROAs (see Figure 12-1).

14 **NEPA Effects:** During the ~~first 10 years of~~ implementation of Alternative 4 ~~induring the near-~~
15 ~~term~~, creating 400 acres of nontidal marsh as part of CM10 would offset the construction-related
16 and inundation losses of ~~134-139~~ acres of nontidal perennial aquatic natural community. There
17 would be no adverse effect. During the full duration of Plan implementation, Alternative 4 would not
18 result in a net reduction in the acreage of a sensitive natural community; there would be an
19 expansion of nontidal marsh and the effect would be beneficial.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 Alternative 4 would result in the loss of approximately ~~134-139~~ acres of nontidal perennial aquatic
23 natural community due to construction of the water conveyance facilities (CM1) and fish passage
24 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration
25 (CM4). The construction losses would occur primarily at reusable tunnel material storage sites near
26 Twin Cities Road and on Bouldin Island, and along the transmission corridor where it crosses
27 Mandeville Island. The losses would be spread across ~~a 10-year~~ the near-term timeframe. These
28 losses would be offset by planned restoration of 400 acres of nontidal marsh scheduled for the first
29 10 years of Alternative 4 implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and AMM10
30 would be implemented to minimize impacts. Because of these offsetting near-term restoration
31 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios
32 (1:1 for restoration and 1:1 for protection) would indicate that ~~134-139~~ acres of restoration and ~~134~~
33 ~~139~~ acres of protection would be needed to offset (i.e., mitigate) the ~~134-139~~ acres of loss. While the
34 Plan does not include protection in the near-term, it includes well in excess of the typical 1:1
35 restoration acreage (which includes protection in perpetuity), and therefore compensates for the
36 lack of protection. The restoration would be initiated at the beginning of Alternative 4
37 implementation to minimize any time lag in the availability of this habitat to special-status species,
38 and would result in a net gain in acreage of this sensitive natural community.

39 **Late Long-Term Timeframe**

40 At the end of the Plan period, ~~333-338~~ acres of the natural community would be removed and 1,200
41 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal
42 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There

1 would be no net permanent reduction in the acreage of this sensitive natural community within the
2 study area. Therefore, Alternative 4 would not have a substantial adverse effect on the nontidal
3 perennial aquatic natural community; the impact would be beneficial.

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

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

- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
13 result in an increase in the frequency, magnitude and duration of inundation of 50–77 acres of
14 nontidal perennial aquatic natural community. The methods used to estimate these inundation
15 acreages are described in ~~BDCP~~ Appendix 5.J, *Effects on Natural Communities, Wildlife, and*
16 *Plants, of the Draft BDCP*. The area more frequently affected by inundation would vary with the
17 flow volume that would pass through the newly constructed notch in the Fremont Weir. The 50-
18 acre increase in inundation would be associated with a notch flow of 3,000 cubic feet per second
19 (cfs), and the 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related
20 increases in flow through Fremont Weir would be expected in 30% of the years. This community
21 occurs in small stringers and patches throughout the bypass, including along the Tule Canal/Toe
22 Drain, the western channels north of Interstate 80, and below the Fremont and Sacramento
23 Weirs. The anticipated change in management of flows in the Yolo Bypass includes more
24 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
25 years, later releases into the bypass in spring months (April and May). The modification of
26 periodic inundation events would not adversely affect the ecological function of this natural
27 community and would not substantially modify its value for special-status or common wildlife
28 species. Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-
29 term regime of periodic inundation events. The extended inundation would be designed to
30 expand foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife
31 and plant species are described in detail in later sections of this chapter.
- 32 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
33 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal
34 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,
35 but they would likely be focused in the south Delta area, along the major rivers and Delta
36 channels. The reconnection of these wetlands to stream flooding events would be beneficial to
37 the ecological function of nontidal perennial aquatic habitats as they relate to BDCP target
38 aquatic species. The periodic flooding may also encourage germination of nontidal marsh
39 vegetation.

40 In summary, 75-102 acres of nontidal perennial aquatic community in the study area would be
41 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation
42 measures (CM2 and CM5). Nontidal perennial aquatic community in the Yolo Bypass has developed
43 under a long-term regime of periodic inundation events and inundation along expanded river
44 floodplains would be infrequent.

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

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

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

15 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
16 associated with changed water management is in effect, there would be new ongoing and periodic
17 actions associated with operation, maintenance and management of the BDCP facilities and
18 conservation lands that could affect nontidal perennial aquatic natural community in the study area.
19 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
20 River flows in the north Delta, and reduced diversions from south Delta channels. These actions
21 would be associated with CM1 (see Impact BIO-13 for effects associated with CM2). The periodic
22 actions would involve access road and conveyance facility repair, vegetation management at the
23 various water conveyance facilities and habitat restoration sites (CM11), levee repair and
24 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
25 natural community management plans. The potential effects of these actions are described below.

- 26 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
27 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect
28 nontidal perennial aquatic natural community, in the form of the reservoir pools. The
29 Alternative 4 operations scheme would alter the surface elevations of these reservoir pools as
30 described in Chapter 6, *Surface Water, of the Draft EIR/EIS*. These fluctuations would occur
31 within historic ranges and would not adversely affect the natural community. Changes in
32 releases that would influence downstream river flows are discussed below.
- 33 • *Modified river flows upstream of and within the study area and reduced diversions from south*
34 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
35 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
36 channels (associated with Operational Scenario H) would not result in the permanent reduction
37 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in
38 the upstream rivers would not change such that the acreage of nontidal perennial aquatic
39 community would be reduced on a permanent basis. Some minor increases and some decreases
40 would be expected to occur along the major rivers during some seasons and in some water-year
41 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento
42 River flows in the north Delta would not result in a permanent reduction in nontidal perennial
43 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are

1 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced
2 diversions from south Delta channels would not create a reduction in this natural community.

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

- 14 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
15 treatment, would be a periodic activity associated with the long-term maintenance of water
16 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
17 *Management*). Vegetation management is also the principal activity associated with *CM13*
18 *Invasive Aquatic Vegetation Control*. Use of herbicides to control nuisance vegetation could pose
19 a long-term hazard to nontidal perennial aquatic natural community at or adjacent to treated
20 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
21 contaminated stormwater onto the natural community, or direct discharge of herbicides to
22 nontidal perennial aquatic areas being treated for invasive species removal. Environmental
23 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been
24 made part of the BDCP to reduce hazards to humans and the environment from use of various
25 chemicals during maintenance activities, including the use of herbicides. These commitments
26 **are described in Appendix 3B**, including the commitment to prepare and implement spill
27 prevention, containment, and countermeasure plans and stormwater pollution prevention
28 plans, **are described in Appendix 3B, Environmental Commitments, of the Draft EIR/EIS**. Best
29 management practices, including control of drift and runoff from treated areas, and use of
30 herbicides approved for use in aquatic environments would also reduce the risk of affecting
31 natural communities adjacent to water conveyance features and levees associated with
32 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, of the Draft EIR/EIS*). These habitat
40 changes should also benefit terrestrial species that use tidal and nontidal perennial aquatic
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 perennial aquatic natural community, a
45 management plan would be prepared that specifies actions to improve the value of the habitats
46 for covered species. Actions would include control of invasive nonnative plant and animal

1 species, fire management, restrictions on vector control and application of herbicides, and
2 maintenance of infrastructure that would allow for movement through the community. The
3 enhancement efforts would improve the long-term value of this community for both special-
4 status and common species.

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

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

21 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
22 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural
23 community in the study area, and could create temporary increases in turbidity and sedimentation.
24 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
25 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
26 these impacts, and other operations and maintenance activities, including management, protection
27 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
28 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
29 improved water movement in these habitats. Long-term restoration activities associated with *CM10*
30 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
31 *Protection and Restoration* would expand this natural community in the study area. Ongoing
32 operation, maintenance and management activities would not result in a net permanent reduction in
33 this sensitive natural community within the study area. Therefore, there would be a less-than-
34 significant impact on the nontidal perennial aquatic natural community.

35 **Nontidal Freshwater Perennial Emergent Wetland**

36 Construction, operation, maintenance and management associated with the conservation
37 components of Alternative 4 would have no long-term adverse effects on the habitats associated
38 with the nontidal freshwater perennial emergent wetland natural community. Initial development
39 and construction of CM1, CM2, CM4, and CM6 would result in both permanent and temporary
40 removal of this community(see Table 12-4-6). Full implementation of Alternative 4 would also
41 include the following conservation actions over the term of the BDCP to benefit the nontidal
42 freshwater perennial emergent wetland natural community.

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

8 There is a variety of other, less specific conservation goals and objectives in **BDCP**-Chapter 3, Section
9 3.3, *Biological Goals and Objectives, of the Draft BDCP* that would improve the value of nontidal
10 freshwater perennial emergent wetland natural community for terrestrial species. As explained
11 below, with the restoration and enhancement of these amounts of habitat, in addition to
12 implementation of AMMs, impacts on this natural community would not be adverse for NEPA
13 purposes and would be less than significant for CEQA purposes.

14 **Table 12-4-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**
15 **Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	2	2	56	56	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
TOTAL IMPACTS	67	126	67	67	6-8	8

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

Unk. = unknown

16

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

19 Construction and land grading activities that would accompany the implementation of CM1, CM2,
20 CM4, and CM6 would permanently eliminate an estimated 126 acres and temporarily remove ~~67~~
21 acres of nontidal freshwater perennial emergent wetland natural community in the study area.
22 These modifications represent approximately 9% of the 1,509 acres of the community that is

1 mapped in the study area. Approximately ~~5856%~~ (73-74 acres) of the permanent and temporary
 2 losses would happen during the ~~first 10 years near-term~~ of Alternative 4 implementation, as water
 3 conveyance facilities are constructed and habitat restoration is initiated. Natural communities
 4 restoration (CM10) would add 1,200 acres of nontidal marsh, consistent with BDCP Objective
 5 NFEW/NPANC1.1, and natural communities protection (CM3) would protect 50 acres of nontidal
 6 marsh, consistent with Objective TRBL1.1. These actions would be taken over the course of BDCP
 7 marsh restoration activities, which would expand the area of that habitat and offset the losses. The
 8 nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and nontidal
 9 freshwater perennial emergent wetland natural communities, as specified in Objective
 10 NFEW/NPANC1.1 (Table 3.3-2 in BDCP Chapter 3, *Conservation Strategy*). The nontidal marsh
 11 protection would be designed to support tricolored blackbird populations in the study area. The
 12 ~~BDCP beneficial effects~~ analysis (~~BDCP~~ Chapter 5, Section 5.4.6.2, *Beneficial Effects of the Draft*
 13 ~~BDCP~~) indicates that implementation of Alternative 4 would result in the restoration of 1,200 acres
 14 of nontidal marsh. The restoration would occur in blocks that are contiguous with the alternative's
 15 larger reserve system. The nontidal marsh would be restored in the vicinity of giant garter snake
 16 subpopulations identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998).

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

- 20 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities
 21 would permanently remove 2 acres and temporarily remove ~~5-6~~ acres of tidal freshwater
 22 perennial emergent wetland community. The permanent losses would occur at the Clifton Court
 23 Forebay construction site and the reusable tunnel material site on Bouldin Island (see
 24 Terrestrial Biology Mapbook in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this
 25 RDEIR/SDEIS). The temporary loss would occur in a temporary work area and where temporary
 26 powerlines would be constructed across Mandeville Island. These wetlands are extremely small
 27 and remote water bodies, surrounded by agricultural operations. These losses would take place
 28 during the near-term construction period.
- 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, west side channels and Tule Canal modifications, Putah Creek
 32 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of
 33 these activities could involve excavation and grading in nontidal freshwater perennial emergent
 34 wetland areas to improve passage of fish through the bypasses. Based on hypothetical
 35 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be
 36 temporarily removed. These losses would most likely occur in the Tule Canal and west side
 37 channels at the north end of the bypass. The habitat here includes narrow bands within these
 38 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow
 39 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity
 40 would occur 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 99 acres of nontidal
 43 freshwater perennial emergent wetland community, primarily in the Cache Slough ROA (see
 44 Figure 12-1). An estimated 1,200 acres of nontidal marsh would be restored (CM10) and 50
 45 acres would be protected (CM3) during nontidal habitat conservation actions. Approximately
 46 400 acres of the restoration and 25 acres of the protection would happen during the first 10

1 years of Alternative 4 implementation, which would coincide with the timeframe of water
2 conveyance facilities construction and early tidal marsh restoration. The remaining restoration
3 would be spread over the following 30 years. Nontidal marsh natural communities restoration is
4 expected to be focused in the vicinity of giant garter snake populations in the eastern Delta and
5 near the Yolo Bypass.

- 6 • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain
7 restoration levee construction would not affect nontidal freshwater perennial emergent wetland
8 natural community.
- 9 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
10 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of
11 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
12 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including
13 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The
14 improvements would occur within the study area on sections of the Sacramento, San Joaquin
15 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 16 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
17 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
18 and nontidal freshwater perennial emergent natural communities. This marsh restoration
19 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
20 would be accompanied by adjacent grassland restoration or protection.

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.

24 ***Near-Term Timeframe***

25 During the near-term timeframe ~~(the first 10 years of BDCP implementation)~~, Alternative 4 would
26 affect the nontidal freshwater perennial emergent wetland community through CM1 construction
27 losses (2 acres permanent and ~~5-6~~ acres temporary) and the CM2 construction losses (25 acres
28 permanent and 1 acre temporary). These losses would occur at the southern forebay, along
29 powerlines across Mandeville Island, and in the Yolo Bypass. Approximately 40 acres of the
30 inundation and construction-related losses from CM4 would occur in the near-term. These losses
31 would occur primarily in the Cache Slough ROA mapped in Figure 12-1.

32 The construction losses of this special-status natural community would represent an adverse effect
33 if they were not offset by avoidance and minimization measures and restoration actions associated
34 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland
35 natural community would be considered both a loss in acreage of a sensitive natural community and
36 a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400
37 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first
38 10 years of Alternative 4 implementation would offset this near-term loss, avoiding any adverse
39 effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would
40 indicate ~~73-74~~ acres of restoration and ~~73-74~~ acres of protection would be needed to offset (i.e.,
41 mitigate) the ~~73-74~~ acres of loss. While the Plan includes just 25 acres of protection in the near-term,
42 it includes well in excess of the typical 1:1 restoration acreage (which includes protection in
43 perpetuity), and therefore compensates for the shortfall in protection.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM6 Disposal and Reuse of Spoils,*
3 *Reusable Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan and AMM10*
4 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that
5 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are
6 described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
7 [updated version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this](#)
8 [RDEIR/SDEISBDCP Appendix 3.C](#).

9 **Late Long-Term Timeframe**

10 Implementation of Alternative 4 as a whole would result in small (9%) losses of nontidal freshwater
11 perennial emergent wetland community in the study area. These losses (126 acres of permanent
12 and ~~6-7~~ acres of temporary loss) would be largely associated with construction of the water
13 conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation
14 during tidal marsh restoration (CM4). Inundation losses would occur during the course of the CM4
15 restoration activities primarily at the Cache Slough ROA. By the end of the Plan timeframe, a total of
16 1,200 acres of nontidal marsh would be restored and 50 acres would be protected. The restoration
17 would occur near giant garter snake occupied habitat in the eastern Delta and near Yolo Bypass, in
18 CZs 2, 4 and 5. The 50 acres of protection would occur in CZ 1, 2, 8 or 11 to provide nesting habitat
19 for tri-colored blackbird (see Figure 12-1).

20 **NEPA Effects:** In the near-term, the combination of creating 400 acres and protecting 25 acres of
21 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated
22 with construction of CM1, CM2 and CM4 facilities, avoiding any adverse effect. With 1,200 acres of
23 nontidal marsh restoration (BDCP Objective NFEW/NPANC1.1) and 50 acres of protection (BDCP
24 Objective TRBL1.1) included with full implementation of the Plan, Alternative 4 would not result in a
25 net long-term reduction in the acreage of a sensitive natural community; the effect would be
26 beneficial.

27 **CEQA Conclusion:**

28 **Near-Term Timeframe**

29 Alternative 4 would result in the loss of approximately ~~33-34~~ acres of nontidal freshwater perennial
30 emergent wetland natural community due to construction of the water conveyance facilities (CM1)
31 and fish passage improvements (CM2). The construction losses would occur near Clifton Court
32 Forebay, along transmission line construction areas on Mandeville Island, and in the Yolo Bypass.
33 Approximately 40 acres of the inundation and construction-related losses from CM4 would occur in
34 the near-term. These losses would occur primarily in the Cache Slough ROA (see Figure 12-1). The
35 losses would be spread across ~~a 10-year~~ near-term timeframe. These losses would be offset by
36 planned restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first
37 10 years of Alternative 4 implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and
38 AMM10 would also be implemented to minimize impacts. Because of these offsetting near-term
39 restoration activities and AMMs, impacts would be less than significant. Typical project-level
40 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that ~~73-74~~ acres of
41 restoration and ~~73-74~~ acres of protection would be needed to offset (i.e., mitigate) the ~~73-74~~ acres of
42 loss. While the Plan includes just 25 acres of protection in the near-term, it includes well in excess of
43 the typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore
44 compensates for the shortfall in protection. The restoration and protection would be initiated at the

1 beginning of Alternative 4 implementation to minimize any time lag in the availability of this habitat
2 to special-status species, and would result in a net gain in acreage of this sensitive natural
3 community.

4 **Late Long-Term Timeframe**

5 At the end of the Plan period, ~~132~~-133 acres of the natural community would be removed, 1,200
6 acres of nontidal marsh would be restored (BDCP Objective NFEW/NPANC1.1) and 50 acres of
7 nontidal marsh would be protected (BDCP Objective TRBL1.1). There would be no net permanent
8 reduction in the acreage of this sensitive natural community within the study area. Therefore,
9 Alternative 4 would not have a substantial adverse effect on the nontidal freshwater perennial
10 emergent wetland natural community; the impact would be beneficial.

11 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 12 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

13 Two Alternative 4 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 nontidal freshwater perennial emergent wetland natural community on small acreages, while
17 CM5 would expose this community to additional flooding as channel margins are modified and
18 levees are set back to improve fish habitat along some of the major rivers and waterways
19 throughout the study area.

- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
21 result in an increase in the frequency and duration of inundation of 6-8 acres of nontidal
22 freshwater perennial emergent wetland natural community. The methods used to estimate
23 these inundation acreages are described in ~~BDCP~~ Appendix 5.J, *Effects on Natural Communities,*
24 *Wildlife, and Plants, of the Draft BDCP*. The area more frequently affected by inundation would
25 vary with the flow volume that would pass through the newly constructed notch in the Fremont
26 Weir. The 6-acre increase in inundation would be associated with a notch flow of 1,000 cubic
27 feet per second (cfs), and the 8-acre increase would result from a notch flow of 6,000 cfs. Plan-
28 related increases in flow through Fremont Weir would be expected in 30% of the years. This
29 community occurs in small stringers and isolated patches along the Tule Canal and western
30 channel in the north end of the bypass. These areas are not connected to other adjacent marsh
31 and open water habitats; they are surrounded by riparian habitat, scoured grassland and
32 agricultural lands. 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 the ecological function of this natural
36 community and would not substantially modify its value for special-status or common wildlife
37 species. Nontidal freshwater perennial emergent wetland plant species in the Yolo Bypass have
38 developed under a long-term regime of periodic inundation events. The extended inundation
39 would be designed to expand foraging and spawning habitat for Delta fishes. The effects of this
40 increased inundation on terrestrial wildlife and plant species are described in detail in later
41 sections of this chapter.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
43 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal
44 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity

1 have not been identified, but they would likely be focused in the south Delta area, along the
2 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events
3 would be beneficial to the ecological function of nontidal freshwater perennial emergent
4 wetland habitats as they relate to BDCP target aquatic species. The added exposure to
5 inundation could also encourage germination of nontidal marsh plant species. Foraging activity
6 and refuge sites would be expanded into areas currently unavailable or infrequently available to
7 some aquatic species.

8 In summary, from 14-16 acres of nontidal freshwater perennial emergent wetland community in the
9 study area would be subjected to more frequent inundation as a result of implementing two
10 Alternative 4 conservation measures (CM2 and CM5). This community would not be adversely
11 affected because its habitats in the Yolo Bypass have developed under a long-term regime of
12 periodic inundation events and inundation along expanded river floodplains would be infrequent.

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

17 **CEQA Conclusion:** An estimated 16-18 acres of nontidal freshwater perennial emergent wetland
18 community in the study area would be subjected to more frequent inundation as a result of
19 implementing CM2 and CM5 under Alternative 4. This community would not be significantly
20 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of
21 periodic inundation events and inundation along expanded river floodplains would be infrequent.
22 The periodic inundation would not result in a net permanent reduction in the acreage of this
23 community in the study area. Therefore, there would be no substantial adverse effect on the
24 community. The impact would be less than significant on the nontidal freshwater perennial
25 emergent wetland natural community.

26 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural** 27 **Community from Ongoing Operation, Maintenance and Management Activities**

28 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
29 associated with changed water management is in effect, there would be new ongoing and periodic
30 actions associated with operation, maintenance and management of the BDCP facilities and
31 conservation lands that could affect nontidal freshwater perennial emergent wetland natural
32 community in the study area. The ongoing actions include modified operation of upstream
33 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from
34 south Delta channels. These actions are associated with CM1 (see Impact BIO-16 for effects
35 associated with CM2). The periodic actions would involve access road and conveyance facility
36 repair, vegetation management at the various water conveyance facilities and habitat restoration
37 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
38 enhancement in accordance with natural community management plans. The potential effects of
39 these actions are described below.

- 40 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
41 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
42 the nontidal freshwater perennial emergent wetland natural community. These reservoirs do
43 not support significant stands of freshwater emergent wetlands. Changes in releases that would
44 influence downstream river flows are discussed below.

- 1 • *Modified river flows upstream of and within the study area and reduced diversions from south*
2 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
3 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
4 channels (associated with Operational Scenario H) would not result in the permanent reduction
5 in acreage of the nontidal freshwater perennial emergent wetland natural community in the
6 study area. The majority of this wetland type exists outside of the levees of the larger rivers and
7 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions
8 of Sacramento River flows in the north Delta would not result in a permanent reduction in
9 nontidal freshwater perennial emergent wetland community downstream of these diversions.
10 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of
11 the river is tidally influenced. Reduced diversions from south Delta channels would not create a
12 reduction in this natural community.
- 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 nontidal freshwater
16 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity
17 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to
18 normal erosion, turbidity and runoff control management practices, including those developed
19 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
20 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
21 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
22 of disturbed surfaces. Proper implementation of these measures would avoid permanent
23 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 nontidal freshwater perennial emergent wetland natural community at or adjacent to treated
29 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
30 contaminated stormwater onto the natural community, or direct discharge of herbicides to
31 nontidal perennial wetland areas being treated for invasive species removal. Environmental
32 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been
33 made part of the BDCP to reduce hazards to humans and the environment from use of various
34 chemicals during maintenance activities, including the use of herbicides. These commitments
35 are described in Appendix 3B, including the commitment to prepare and implement spill
36 prevention, containment, and countermeasure plans and stormwater pollution prevention
37 plans, are described in Appendix 3B, Environmental Commitments, of the Draft EIR/EIS. Best
38 management practices, including control of drift and runoff from treated areas, and use of
39 herbicides approved for use in aquatic environments would also reduce the risk of affecting
40 natural communities adjacent to water conveyance features and levees associated with
41 restoration activities.
- 42 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
43 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
44 The treatment activities would be conducted in concert with the California Department of
45 Boating and Waterways' invasive species removal program. Eliminating large stands of water
46 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species

1 by removing cover for nonnative predators, improving water flow and removing barriers to
2 movement (see Chapter 11, *Fish and Aquatic Resources*, [of the Draft EIR/EIS](#)). These habitat
3 changes should also benefit terrestrial species that use tidal and nontidal freshwater perennial
4 emergent wetland natural community for movement corridors and for foraging. Vegetation
5 management effects on individual species are discussed in the species sections on following
6 pages.

- 7 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
8 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland
9 natural community, a management plan would be prepared that specifies actions to improve the
10 value of the habitats for covered species. Actions would include control of invasive nonnative
11 plant and animal species, fire management, restrictions on vector control and application of
12 herbicides, and maintenance of infrastructure that would allow for movement through the
13 community. The enhancement efforts would improve the long-term value of this community for
14 both special-status and common species.

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

28 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
29 Alternative 4 would not result in a net permanent reduction in the nontidal freshwater perennial
30 emergent wetland natural community within the study area. Therefore, there would be no adverse
31 effect on this natural community.

32 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
33 have the potential to create minor changes in total acreage of nontidal freshwater perennial
34 emergent wetland natural community in the study area, and could create temporary increases in
35 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
36 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
37 AMM5 would minimize these impacts, and other operations and maintenance activities, including
38 management, protection and enhancement actions associated with *CM3 Natural Communities*
39 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
40 create positive effects, including improved water movement in and adjacent to these habitats. Long-
41 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and protection actions
42 associated with *CM3 Natural Communities Protection and Restoration* would expand this natural
43 community in the study area. Ongoing operation, maintenance and management activities would not
44 result in a net permanent reduction in this sensitive natural community within the study area.

1 Therefore, there would be a less-than-significant impact on the nontidal freshwater perennial
2 emergent wetland natural community.

3 **Alkali Seasonal Wetland Complex**

4 Construction, operation, maintenance and management associated with the conservation
5 components of Alternative 4 would have no long-term adverse effects on the habitats associated
6 with the alkali seasonal wetland complex natural community. Initial development and construction
7 of CM1, CM2 and CM4 would result in both permanent and temporary removal of this
8 community(see Table 12-4-7). Full implementation of Alternative 4 would also include the following
9 conservation actions over the term of the BDCP to benefit the alkali seasonal wetland natural
10 community.

- 11 • Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a
12 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with
13 CM3).
- 14 • Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no
15 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)
16 (Objective ASWNC1.2, associated with CM3 and CM9).
- 17 • Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
18 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

19 There is a variety of other, less specific conservation goals and objectives in ~~BDCP~~ Chapter 3, Section
20 3.3, *Biological Goals and Objectives, of the Draft BDCP* that would improve the value of alkali seasonal
21 wetland natural community for terrestrial species. As explained below, with the protection,
22 restoration, and enhancement of the amounts of habitat listed in the BDCP objectives, in addition to
23 implementation of AMMs, impacts on this natural community would not be adverse for NEPA
24 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	02	02	20	20	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
TOTAL IMPACTS	5860	7274	20	20	264–744	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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. They represent the total loss of habitat that would occur over the 50-year life of the Plan. The LLT totals do not reflect the increases in habitat that would result from restoration 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

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 CM1, CM2 and CM4 under Alternative 4 would permanently eliminate an
8 estimated ~~72-74~~ acres ~~and temporarily remove an estimated 2 acres~~ of alkali seasonal wetland
9 complex natural community in the study area. ~~There would be no temporary impacts to alkali~~
10 ~~seasonal wetlands.~~ These modifications represent approximately 2% of the 3,723 acres of the
11 community that is mapped in the study area. Most of the losses (60 acres or 83%) would happen
12 during the ~~first 10 years~~ ~~near-term~~ of Alternative 4 implementation, as the water conveyance facility
13 is constructed, the Yolo Bypass improvements are initiated, and habitat restoration is initiated.
14 Alkali seasonal wetland complex protection (120 acres) and restoration (an estimated 58 acres, but
15 determined by actual level of effect) would be initiated during the same period; when combined,
16 these actions would offset the losses. By the end of the Plan period, 150 acres of this natural
17 community would be protected and up to ~~72-74~~ acres would be restored. The ~~BDCP beneficial effects~~
18 ~~analysis for this community (BDCP in Chapter 5, Section 5.4.7.2, Beneficial Effects, of the Draft BDCP)~~
19 states that Alternative 4 would protect 150 acres of alkali seasonal wetland in Conservation Zones 1,
20 8, or 11, in a mosaic of protected grasslands and vernal pool complex. This would protect currently
21 unprotected high-value alkali seasonal wetland complex in the Plan Area.

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 4 ~~temporary~~-transmission
5 lines immediately west of Clifton Court Forebay would ~~temporarily-permanently~~ affect 2 acres
6 of alkali seasonal wetland complex natural community. The alkali seasonal wetland complex at
7 this location is scattered and significantly degraded by past agricultural and water development-
8 related activities. It is surrounded by or adjacent to vernal pool complex natural community.

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

- 23 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
24 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
25 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
26 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and
27 grading in alkali seasonal wetland complex as a new channel is constructed. Based on
28 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex
29 is located immediately south of the existing Putah Creek channel within the bypass, and is a
30 relatively large, moderate to high value, contiguous expanse of this community. This loss would
31 occur in the near-term timeframe.

- 32 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 150 acres
33 of alkali seasonal wetland complex in CZ 1, CZ 8, and CZ 11 (Objective ASWNC1.1). The
34 protection would occur in areas containing a mosaic of grassland and vernal pool complex in
35 unfragmented natural landscapes supporting a diversity of native plant and wildlife species.
36 These areas would be both protected and enhanced to increase the cover of alkali seasonal
37 wetland plants relative to nonnative species.

- 38 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
39 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali
40 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the
41 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh
42 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in
43 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.
44 These losses would not fragment the alkali seasonal wetland communities adjacent to these
45 sloughs because the losses would occur on the edges of the existing habitat.

- 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 intent of the
3 conservation measure is to match the acreage of restoration with the actual acreage lost to other
4 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal
5 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of
6 the BDCP restoration period. The goal is for no net loss of this natural community, consistent
7 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA
8 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat
9 connectivity goals mapped in Figure 12-2 and described in Table 3.2-2 of ~~BDCP~~ Chapter 3,
10 *Conservation Strategy, of the Draft BDCP*.

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 During the near-term timeframe ~~(the first 10 years of BDCP implementation)~~, Alternative 4 would
16 affect the alkali seasonal wetland complex natural community through CM1 and CM2 construction
17 losses ~~(45-47 acres permanent and 2 acres temporary)~~. These losses would occur in the Yolo Bypass
18 south of Putah Creek and on land immediately west of Clifton Court Forebay. Approximately 13
19 acres of the inundation and construction-related losses in habitat from CM4 would occur in the
20 near-term. These losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped
21 in Figure 12-1.

22 The construction losses of this special-status natural community would represent an adverse effect
23 if they were not offset by avoidance and minimization measures and restoration actions associated
24 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community
25 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
26 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
27 complex as part of CM3, the restoration of 58 acres of this community as part of CM9, and the
28 implementation of *AMM30 Transmission Line Design and Alignment Guidelines* during the first 10
29 years of Alternative 4 implementation would offset this near-term loss, avoiding any adverse effect.
30 AMM30 would require that transmission line construction avoid any losses of alkali seasonal
31 wetland complex natural community (see ~~BDCP Appendix 3.C, Avoidance and Minimization~~
32 ~~Measures Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP a~~ for a full
33 description of AMM30). Typical project-level mitigation ratios (2:1 for protection and 1:1 for
34 restoration) would indicate 120 acres of protection and 60 acres of restoration would be needed to
35 offset (i.e., mitigate) the 60 acres of loss.

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. The AMMs are described in detail in
41 ~~Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of~~
42 ~~AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix~~
43 ~~3.C.~~

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 4 as a whole would result in relatively minor (2%) losses of alkali
3 seasonal wetland natural community in the study area. These losses (74 acres) would be largely
4 associated with construction of Yolo Bypass fish improvements (CM2) and inundation during tidal
5 marsh restoration (CM4). Inundation losses would occur during the course of BDCP restoration
6 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

7 **NEPA Effects:** In the first 10 years of implementing Alternative 4 conservation measures, 120 acres
8 of alkali seasonal wetland complex would be protected as part of CM3 and 58 acres of this
9 community would be restored as part of CM9. These conservation actions would offset the near-
10 term loss of this community associated with CM1, CM2 and CM4, avoiding any adverse effect. By the
11 end of the Plan timeframe, Alternative 4 would protect a total of 150 acres of alkali seasonal wetland
12 natural community (CM3) and would restore up to 72 acres (CM9). The protection and restoration
13 would occur primarily in CZ 1, CZ 8 and/or CZ 11, in the Cache Slough, Suisun Marsh and Clifton
14 Court Forebay areas. Therefore, Alternative 4 would not have an adverse effect on the alkali
15 seasonal wetland complex natural community.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Alternative 4 would result in the permanent loss of approximately ~~58-60~~ acres of alkali seasonal
19 wetland complex natural community due to water conveyance facility construction (CM1), to
20 construction of fish passage improvements (CM2), and inundation during tidal marsh restoration
21 (CM4). ~~Two acres would be lost temporarily to water conveyance facility construction (CM1)~~. The
22 construction losses would occur primarily in the area just south of Putah Creek in the Yolo Bypass
23 and adjacent to Clifton Court Forebay, while inundation losses would occur in the Cache Slough and
24 Suisun Marsh ROAs. The losses would be spread across ~~a 10-year~~the near-term timeframe.

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 other actions associated with
27 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would
28 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
29 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
30 complex as part of CM3, the restoration of 58 acres of this community as part of CM9, and the
31 implementation of *AMM30 Transmission Line Design and Alignment Guidelines* during the first 10
32 years of Alternative 4 implementation would offset this near-term loss, avoiding any significant
33 impact. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would
34 indicate 120 acres of protection and 60 acres or restoration would be needed to offset (i.e., mitigate)
35 the 60 acres of loss. AMM1, AMM2, AMM3, AMM4, and AMM10 would also be implemented to
36 minimize impacts. Because of the offsetting protection and restoration activities and AMMs, impacts
37 would be less than significant.

38 **Late Long-Term Timeframe**

39 At the end of the Plan period, ~~72-74~~ acres of alkali seasonal wetland complex natural community
40 would be permanently removed by conservation actions, 150 acres would be protected and up to ~~72~~
41 74 acres would be restored. The restoration acres actually developed would depend on the number
42 of acres affected during Alternative 4 implementation. There would be no net permanent reduction

1 in the acreage of this natural community within the study area. Therefore, Alternative 4 would have
2 a less-than-significant impact on the alkali seasonal wetland complex natural community.

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

5 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation regime of the Yolo Bypass, a
6 man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat
7 for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland
8 complex natural community at scattered locations in the central and southern sections of the
9 bypass.

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

24 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
25 Alternative 4 would not adversely affect alkali seasonal wetland complex habitats, as they have
26 persisted under similar high flows and extended inundation periods. There is the potential for some
27 change in plant species composition as a result of longer inundation periods, but the natural
28 community would persist.

29 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural
30 community in the Yolo Bypass would be subjected to more frequent inundation as a result of
31 implementing CM2 under Alternative 4. This natural community is conditioned to periodic
32 inundation; the slight increase in periodic inundation would not result in a net permanent reduction
33 in the acreage of this community in the study area, although some change in plant species
34 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural
35 community in the Yolo Bypass would have a less-than-significant impact on this natural community.
36 The effects of this inundation on wildlife and plant species are described in detail in later sections of
37 this chapter.

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

40 Once the physical facilities associated with Alternative 4 were constructed and the stream flow
41 regime associated with changed water management was 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 alkali seasonal wetland complex natural community in the study

1 area. The ongoing actions include modified operation of upstream reservoirs, the diversion of
2 Sacramento River flows in the north Delta, reduced diversions from south Delta channels, and
3 recreation in and adjacent to Plan reserves. These actions are associated with CM1 and CM11 (see
4 Impact BIO-19 for effects associated with CM2). The periodic actions would involve access road and
5 conveyance facility repair, vegetation management at the various water conveyance facilities and
6 habitat restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging,
7 and habitat enhancement in accordance with natural community management plans. The potential
8 effects of these actions are described 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, increased
11 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
12 channels (associated with Operational Scenario H) would not affect alkali seasonal wetland
13 natural community. This natural community does not exist within or adjacent to the active
14 Sacramento River system channels and Delta waterways that would be affected by modified
15 flow levels.
- 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 in or adjacent to alkali
19 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff
20 entering these habitats. These activities would be subject to normal erosion and runoff control
21 management practices, including those developed as part of *AMM2 Construction Best*
22 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
23 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats
24 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces
25 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper
26 implementation of these measures would 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 (*CM11 Natural Communities Enhancement and*
30 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
31 alkali seasonal wetland complex natural community at or adjacent to treated areas. The hazard
32 could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
33 stormwater onto the natural community, or direct discharge of herbicides to alkali seasonal
34 wetland complex areas being treated for invasive species removal. Environmental commitments
35 and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been made part of the
36 BDCP to reduce hazards to humans and the environment from use of various chemicals during
37 maintenance activities, including the use of herbicides. These commitments ~~are described in~~
38 ~~Appendix 3B~~, including the commitment to prepare and implement spill prevention,
39 containment, and countermeasure plans and stormwater pollution prevention plans, ~~are~~
40 ~~described in Appendix 3B, Environmental Commitments, of the Draft EIR/EIS~~. Best management
41 practices, including control of drift and runoff from treated areas, and use of herbicides
42 approved for use in terrestrial environments would also reduce the risk of affecting natural
43 communities adjacent to water conveyance features and levees associated with restoration
44 activities.
- 45 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
46 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural

1 community, a management plan would be prepared that specifies actions to improve the value
2 of the habitats for covered species. Actions would include control of invasive nonnative plant
3 and animal species, fire management, restrictions on vector control and application of
4 herbicides, and maintenance of infrastructure that would allow for movement through the
5 community. The enhancement efforts would improve the long-term value of this community for
6 both special-status and common species.

- 7 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to alkali
8 seasonal wetland natural community in the reserve system. The activities could include wildlife
9 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (~~BDCP~~
10 ~~Chapter 3, Section 3.4.11~~) describes this program and identifies applicable restrictions on
11 recreation that might adversely affect alkali seasonal wetland habitat (see Chapter 3, Section
12 3.4.11 of the Draft BDCP and Appendix D, Section D.3.2.5 of this RDEIR/SDEIS). BDCP also
13 includes an avoidance and minimization measure (AMM37) that further dictates limits on
14 recreation activities that might affect this natural community. Most recreation would be docent-
15 led wildlife and botanical tours, using existing trails and roads in the vicinity of the reserves. No
16 new trails would be constructed.

17 The various operations and maintenance activities described above could alter acreage of alkali
18 seasonal wetland complex natural community in the study area. Activities could introduce sediment
19 and herbicides that would reduce the value of this community to common and sensitive plant and
20 wildlife species. Other periodic activities associated with the Plan, including management,
21 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
22 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
23 enhance the value of the community. While some of these activities could result in small changes in
24 acreage, these changes would be offset by protection and restoration activities planned as part of
25 *CM3 Natural Communities Protection and Restoration* and *CM9 Vernal Pool and Alkali Seasonal*
26 *Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10
27 and AMM37. The management actions associated with control of invasive plant species would also
28 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats
29 by eliminating competitive, invasive species of plants.

30 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
31 Alternative 4 would not result in a net permanent reduction in this natural community within the
32 study area. Therefore, there would be no adverse effect on the alkali seasonal wetland complex
33 natural community.

34 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
35 have the potential to create minor changes in total acreage of alkali seasonal wetland complex
36 natural community in the study area, and could create temporary increases sedimentation. The
37 activities could also introduce herbicides periodically to control nonnative, invasive plants.
38 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10 and AMM37
39 would minimize these impacts, and other operations and maintenance activities, including
40 management, protection and enhancement actions associated with *CM3 Natural Communities*
41 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
42 create positive effects, including reduced competition from invasive, nonnative plants in these
43 habitats. Long-term restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal*
44 *Wetland Complex Restoration* and protection actions associated with *CM3 Natural Communities*
45 *Protection and Restoration* would ensure that the acreage of this natural community would not

1 decrease in the study area. Ongoing operation, maintenance and management activities would not
2 result in a net permanent reduction in this natural community within the study area. Therefore,
3 there would be a less-than-significant impact on the alkali seasonal wetland complex natural
4 community.

5 **Vernal Pool Complex**

6 Construction, operation, maintenance and management associated with the conservation
7 components of Alternative 4 would have no long-term adverse effects on the habitats associated
8 with the vernal pool complex natural community. Initial development and construction of CM1 and
9 CM4 would result in permanent removal of 216 acres of this community (see Table 12-4-8). Full
10 implementation of Alternative 4 would also include the following conservation actions over the term
11 of the BDCP to benefit the vernal pool complex natural community.

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

18 There is a variety of other, less specific conservation goals and objectives in ~~BDCP~~ Chapter 3, Section
19 3.3 *Biological Goals and Objectives, of the Draft BDCP* that would improve the value of vernal pool
20 complex natural community for terrestrial species. As explained below, with the protection,
21 restoration and enhancement of the amounts of habitat listed in the BDCP objectives, in addition to
22 implementation of AMMs, impacts on this natural community would not be adverse for NEPA
23 purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	1528	1528	163	163	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
TOTAL IMPACTS	216229	387400	163	163	0-4	0

^a See Appendix 12E, Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS, for a 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

Unk. = unknown

3
4

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

5 Construction, land grading and habitat restoration activities that would accompany the
6 implementation of CM1 and CM4 could permanently eliminate an estimated ~~387,400~~ acres and
7 temporarily remove ~~163~~ acres of vernal pool complex natural community in the study area. These
8 acreages are based on the proposed location of the CM1 construction footprint and a theoretical
9 footprint for CM4 tidal marsh restoration activities. The loss of this combined 403 acres would
10 represent approximately 3% of the 12,133 acres of the community that is mapped in the study area.
11 An estimated 232 acres of the loss could occur during ~~the first 10 years~~ the near-term of Alternative
12 4 implementation, as the water conveyance facility is constructed and tidal marsh restoration is
13 initiated. Vernal pool complex protection (400 acres) and restoration (an estimated 40 acres, with
14 actual restoration based on level of effect) would be initiated during the first 10 years of Alternative
15 4 implementation to counteract the loss of habitat. By the end of the Plan period, 600 acres of this
16 natural community would be protected and up to 67 acres would be restored. Because of the high
17 sensitivity of this natural community and its shrinking presence in the Plan Area, avoidance and
18 minimization measures have been built into the BDCP to eliminate the majority of this potential loss.
19 The ~~BDCP beneficial effect~~ analysis (BDCPin Chapter 5, Section 5.4.8.2, Beneficial Effects, of the Draft
20 BDCP) indicates that implementation of Alternative 4 would protect at least 600 acres of vernal pool
21 complex in Conservation Zones 1, 8, and 11 and additional vernal pool complex would be restored to
22 achieve no net loss of this community.

1 The individual effects of the 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 4 water conveyance facilities
5 would directly affect 31 acres of vernal pool complex natural community, including ~~15-28~~ acres
6 permanently affected and ~~16-3~~ acres temporarily affected. The permanent loss would occur
7 along the southern edge of Clifton Court Forebay, where the forebay would be expanded to
8 provide greater storage capacity ~~and from the construction of permanent transmission lines.~~
9 The temporary losses would ~~occur occur along transmission lines that would be constructed~~
10 ~~immediately west of in a temporary work area immediately adjacent to~~ Clifton Court Forebay
11 (see Figure 12-1 and the Terrestrial Biology Mapbook ~~in Appendix A, Draft EIR/EIS In-Text~~
12 ~~Chapter Revisions, of this RDEIR/SDEIS~~).

13 Because of the close proximity of construction activity to adjacent vernal pool complex, ~~both~~
14 near Clifton Court Forebay ~~and Stone Lakes National Wildlife Refuge~~, there is also the potential
15 for indirect loss or damage to vernal pools from changes in pool hydrology or deposition of
16 construction-related sediment. These potential indirect effects are discussed in detail in the
17 vernal pool crustaceans impact analysis later in this chapter.

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

- 34 • *CM3 Natural Communities Protection and Restoration:* CM3 proposes to protect at least 600 acres
35 of vernal pool complex in CZ 1, CZ 8, and CZ 11 (BDCP Objective VPNC1.1). The protection would
36 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented
37 natural landscapes supporting a diversity of native plant and wildlife species. These areas would
38 be both protected and enhanced to increase the cover of vernal pool complex plants relative to
39 nonnative species.
- 40 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
41 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and
42 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal
43 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres
44 could be affected. The principal areas likely to be affected include the Cache Slough drainage just
45 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 restoration period. This restoration conservation measure includes a “no net loss”
5 policy normally applied to this natural community (BDCP Objective VPNC1.2).

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.

9 ***Near-Term Timeframe***

10 During the near-term timeframe ~~(the first 10 years of BDCP implementation)~~, Alternative 4 could
11 directly affect 232 acres of vernal pool complex natural community through inundation or
12 construction-related losses in habitat from CM1 and CM4 activities. This loss would likely occur in
13 the Cache Slough or Suisun Marsh ROAs mapped in Figure 12-1 [in Appendix A, Draft EIR/EIS In-Text](#)
14 [Chapter Revisions, of this RDEIR/SDEIS](#), and in the vicinity of Clifton Court Forebay (see the
15 Terrestrial Biology Mapbook [in Appendix A](#)).

16 The construction or inundation loss of this special-status natural community would represent an
17 adverse effect if it were not offset by avoidance and minimization measures and restoration actions
18 associated with BDCP conservation components. Loss of vernal pool complex natural community
19 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
20 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of
21 CM3 and the restoration of up to 40 acres of this community (including a commitment to have
22 restoration keep pace with losses; [BDCP Chapter 3, Section 3.4.9, Conservation Measure 9, in the](#)
23 [Draft BDCP4.27](#)) as part of CM9 during the first 10 years of Alternative 4 implementation would
24 partially offset this near-term loss. The Plan focuses this protection in the core vernal pool areas
25 identified in the USFWS vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core
26 areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). Typical project-level mitigation ratios (2:1 for
27 protection and 1:1 for restoration) would indicate 464 acres of protection and 232 acres of
28 restoration would be needed to offset (i.e., mitigate) the 232 acres of loss. Without additional
29 avoidance and minimization measures to reduce the potential effect, the proposed protection and
30 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. This is equivalent to approximately 67 acres of direct loss
39 and 134 acres of indirect loss of vernal pool complex natural community. The AMMs are described in
40 detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated](#)
41 [version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)
42 [BDCP Appendix 3.C](#). With these AMMs in place, Alternative 4 would not adversely affect vernal pool
43 complex 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 ~~387~~400 acres of
3 permanent and ~~16~~3 acres of temporary loss. These losses would be associated with the construction
4 of CM1 facilities in the vicinity of Clifton Court Forebay and the ongoing restoration of tidal wetland
5 in the Cache Slough and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up
6 to 67 acres would be restored (CM9) through the course of Alternative 4 implementation. In
7 addition, the avoidance and minimization measures listed above would reduce the actual loss of this
8 community to no more than 10 wetted acres of vernal pool crustacean habitat from direct activities
9 and 20 acres of habitat from indirect effects.

10 **NEPA Effects:** The conservation measures associated with Alternative 4 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 4 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 Alternative
17 4 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 4 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 4 could result in the direct loss of
23 approximately 232 acres of vernal pool complex natural community due to inundation during tidal
24 marsh restoration (CM4) and construction of the water conveyance facility (CM1). The losses would
25 likely occur in the Cache Slough or Suisun Marsh ROAs, and immediately adjacent to Clifton Court
26 Forebay.

27 The construction- and inundation-related loss of this special-status natural community would
28 represent a significant impact if it were not offset by avoidance and minimization measures and
29 other actions associated with BDCP conservation components. Loss of vernal pool complex natural
30 community would be considered both a loss in acreage of a sensitive natural community and a loss
31 of wetland as defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex
32 as part of CM3 and the restoration of an estimated 40 acres of this community (including a
33 commitment to have restoration keep pace with losses; BDCP-Chapter 3, Section 3.4.9, Conservation
34 Measure 9, in the Draft BDCP4-27) as part of CM9 during the first 10 years of Alternative 4
35 implementation would partially offset this near-term loss. Typical project-level mitigation ratios
36 (2:1 for protection and 1:1 for restoration) would indicate 464 acres of protection and 232 acres of
37 restoration would be needed to offset (i.e., mitigate) the 232 acres of loss. Without additional
38 avoidance and minimization measures to reduce the potential impact, the proposed protection and
39 restoration would not meet the typical mitigation for vernal pool complex losses. However,
40 Alternative 4 also includes AMM1, AMM2, AMM3, AMM4, AMM10, AMM12 and AMM30 to minimize
41 impacts. AMM12 places a strict limit on the acres of wetted vernal pool crustacean habitat that can
42 be lost to conservation actions (10 acres of direct and 20 acres of indirect loss). Because of the
43 offsetting protection and restoration activities and implementation of AMMs, impacts would be less
44 than significant.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, ~~387~~~~400~~ acres of vernal pool complex natural community could be
3 permanently removed and ~~16~~~~3~~ acres could be temporarily removed. Through CMs 3 and 9, 600
4 acres of vernal pool complex natural community would be protected and up to 67 acres would be
5 restored. In addition, AMM12 would limit the acres of wetted vernal pool crustacean habitat loss to
6 10 acres from direct actions and 20 acres from indirect actions. This is equivalent to the direct loss
7 of 67 acres and the indirect loss of 134 acres of vernal pool complex natural community. There
8 would be no net permanent reduction in the acreage of this natural community within the study
9 area. Alternative 4 would have a less-than-significant impact 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 4 would result in an increase in the frequency,
17 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural
18 community. The methods used to estimate this inundation acreage are described in *BDCP* Appendix
19 5.J, *Effects on Natural Communities, Wildlife, and Plants, of the Draft BDCP*. The area more frequently
20 affected by inundation would vary with the flow volume that would pass through the newly
21 constructed notch in the Fremont Weir. The 4-acre increase in inundation would only occur at the
22 highest modeled flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would
23 be expected in 30% of the years.

24 The vernal pool complex natural community that would likely be affected occurs in the southern
25 reaches of the bypass, south of Putah Creek. There are several relatively large, contiguous areas of
26 vernal pools on the western edge of the bypass in this area. The anticipated change in management
27 of flows in the Yolo Bypass includes more frequent releases in flows into the bypass from the
28 Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring months
29 (April and May).

30 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
31 Alternative 4 water operations would not adversely affect vernal pool complex habitats, as they
32 have persisted under similar high flows and extended inundation periods. There is the potential,
33 however, for some change in plant species composition as a result of longer inundation periods.

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

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

3 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
4 associated with changed water management is in effect, there would be new ongoing and periodic
5 actions associated with operation, maintenance and management of the BDCP facilities and
6 conservation lands that could affect vernal pool complex natural community in the study area. The
7 ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
8 River flows in the north Delta, reduced diversions from south Delta channels, and recreation
9 activities in Plan preserves. These actions are associated with CM1 and CM11 (see Impact BIO-22 for
10 effects associated with CM2). The periodic actions would involve access road and conveyance facility
11 repair, vegetation management at the various water conveyance facilities and habitat restoration
12 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
13 enhancement in accordance with natural community management plans. The potential effects of
14 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 H) would not affect vernal pool complex natural
19 community. This natural community does not exist within or adjacent to the major Sacramento
20 River system and Delta waterways.
- 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 adjacent to vernal pool
24 complex 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 vernal pool complex habitats would require use of sediment barriers, soil
29 stabilization and revegetation of disturbed surfaces as part of *AMM10 Restoration of Temporarily*
30 *Affected Natural Communities*. Proper implementation of these measures would avoid
31 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 vernal pool complex natural community at or adjacent to treated areas. The hazard could be
37 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
38 onto the natural community, or direct discharge of herbicides to vernal pool complex 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, ~~are described in Appendix~~
45 ~~3B, Environmental Commitments, of the Draft EIR/EIS.~~ Best management practices, including
46 control of drift and runoff from treated areas, and use of herbicides approved for use in

1 terrestrial or aquatic environments would also reduce the risk of affecting natural communities
2 adjacent to water conveyance features and levees associated with restoration activities.

- 3 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
4 communities within the Plan Area (CM11). For the vernal pool complex 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, fire management, restrictions on vector control and application of herbicides, and
8 maintenance of infrastructure that would allow for movement through the community. The
9 enhancement efforts would improve the long-term value of this community for both special-
10 status and common species.
- 11 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool
12 complexes in the reserve system. The activities could include wildlife and plant viewing and
13 hiking. *CM11 Natural Communities Enhancement and Management* (~~BDCP Chapter 3, Section~~
14 ~~3.4.11~~) describes this program and identifies applicable restrictions on recreation that might
15 adversely affect vernal pool habitat (see Chapter 3, Section 3.4.11 of the Draft BDCP and
16 Appendix D, Section D.3.2.5 of this RDEIR/SDEIS). BDCP also includes an avoidance and
17 minimization measure (AMM37) that further dictates limits on recreation activities that might
18 affect vernal pools. Recreational trails would be limited to existing trails and roads. New trail
19 construction would be prohibited within the vernal pool complex reserves. It is expected that
20 most activities would be docent-led tours of reserves, minimizing adverse effects.

21 The various operations and maintenance activities described above could alter acreage of vernal
22 pool complex natural community in the study area. Activities could introduce sediment and
23 herbicides that would reduce the value of this community to common and sensitive plant and
24 wildlife species. Other periodic activities associated with the Plan, including management,
25 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
26 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
27 enhance the value of the community. While some of these activities could result in small changes in
28 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*
29 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of
30 AMM2, AMM4, AMM5, AMM10, AMM12, AMM37 and AMM30. The management actions associated
31 with control of invasive plant species would also result in a long-term benefit to the species
32 associated with vernal pool complex habitats by eliminating competitive, invasive species of plants.

33 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
34 Alternative 4 would not result in a net permanent reduction in the vernal pool complex natural
35 community within the study area. Therefore, there would be no adverse effect on this natural
36 community.

37 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
38 have the potential to create minor changes in total acreage of vernal pool complex natural
39 community in the study area, and could create temporary increases in sedimentation or damage
40 from recreational activity. The activities could also introduce herbicides periodically to control
41 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,
42 AMM5, AMM10, AMM12, AMM37 and AMM30 would minimize these impacts, and other operations
43 and maintenance activities, including management, protection and enhancement actions associated
44 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
45 *Enhancement and Management*, would create positive effects, including reduced competition from

1 invasive, nonnative plants in these habitats. Long-term restoration activities associated with *CM9*
2 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with
3 *CM3 Natural Communities Protection and Restoration* would ensure that the acreage of this natural
4 community would not decrease in the study area. Ongoing operation, maintenance and management
5 activities would not result in a net permanent reduction in this natural community within the study
6 area. Therefore, there would be a less-than-significant impact on the vernal pool complex natural
7 community.

8 **Managed Wetland**

9 The conservation components of Alternative 4 would reduce the acreage of managed wetland
10 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6
11 would result in both permanent and temporary removal of this community (see Table 12-4-9). Full
12 implementation of Alternative 4 would also include the following conservation action over the term
13 of the BDCP to benefit the managed wetland natural community.

- 14 • Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the
15 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 16 • Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in
17 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in
18 Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood
19 events (Objective GSHC1.3, associated with CM10).
- 20 • Create two wetland complexes within the Stone Lakes NWR refuge boundary. Each complex will
21 consist of at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One
22 of the wetland complexes may be replaced by 180 acres of cultivated lands that are flooded
23 following harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with
24 CM10).

25 In addition to this conservation action, creation of similar habitat values by restoring tidal brackish
26 emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the
27 losses of managed wetland. The net effect would be a substantial decrease in the amount of
28 managed wetland, but an increase in similar habitat value for special-status and common species as
29 the managed wetland is converted to tidal marsh. Impacts on this natural community would not be
30 adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to Impacts
31 BIO-178 through BIO-183 in the *Shorebirds and Waterfowl* discussion at the end of this section
32 (Section 12.3.3.9) for further consideration of the effects of removing managed wetland natural
33 community.

1 **Table 12-4-9. Changes in Managed Wetland Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	722	722	2829	2829	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
TOTAL IMPACTS	5,749 5,764	13,777 13,792	727 723	727 723	931-2,612	6

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

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
7 ~~13,777~~**13,792** acres of managed wetland in the study area. This modification represents
8 approximately 19% of the 70,798 acres of managed wetland that is mapped in the study area. This
9 loss would occur over the course of BDCP restoration activity, as construction and tidal marsh
10 restoration proceed. Managed wetland protection (8,100 acres) and restoration (500 acres) would
11 take place over the same period, but would not replace the acreage lost. The *BDCP beneficial effects*
12 *analysis for Alternative 4 (BDCP)* in Chapter 5, Section 5.4.9.2, *Beneficial Effects of the Draft BDCP*
13 states that at least 8,100 acres of managed wetlands would be protected, of which at least 1,500
14 acres would be located within the Grizzly Island marsh complex, consistent with the U.S. Fish and
15 Wildlife Service salt marsh harvest mouse recovery plan. Although the primary purpose of the 1,500
16 acres of protection is to protect and enhance habitat for the salt marsh harvest mouse, it is also
17 expected to benefit the managed wetland natural community and the diversity of species that use it,
18 including migratory waterfowl and the western pond turtle.

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.

- 1 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities
2 would permanently remove ~~7-22~~ acres and temporarily remove ~~28-29~~ acres of managed wetland
3 community. The permanent ~~and temporary~~ losses would occur near the northeast corner of
4 Clifton Court Forebay for the construction of a permanent shaft location and a permanent access
5 road on Bouldin Island. Temporary impacts would occur in association with a temporary work
6 areas for a concrete batch plant on Mandeville Island primarily on the northeastern end of
7 Mandeville Island and the reusable tunnel material tunnel much conveyor facility near Clifton
8 Court Forebay, adjacent to the San Joaquin River. A permanent access road and tunnel shaft at
9 that site would create the permanent impact (see Terrestrial Biology Mapbook in Appendix A,
10 Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS). ~~A large temporary loss would also~~
11 ~~occur at this site, from a shaft work area.~~ Smaller losses would occur from construction of the
12 ~~permanent and~~ temporary transmission lines that parallel the tunnel alignment northwest of
13 the intermediate forebay, ~~at the Mokelumne River adjacent to Dead Horse Island,~~ and across the
14 length of Mandeville Island. These losses would take place during the near-term construction
15 period.
- 16 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
17 construction activities that could permanently or temporarily remove managed wetland,
18 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir
19 modification and Sacramento Weir improvements. All of these activities could involve
20 excavation and grading in managed wetland areas to improve passage of fish through the
21 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
22 permanently removed and 44 acres could be temporarily removed. This activity would occur
23 primarily in the near-term timeframe.
- 24 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
25 footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of
26 managed wetland community. These losses would be expected to occur primarily in the Suisun
27 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).
28 These acres of managed wetland would be converted to natural wetland, including large
29 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These
30 natural wetlands provide comparable or improved habitat for the special-status species that
31 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in
32 fragmentation of managed wetland, as most species are capable of utilizing both communities.
33 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be
34 enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as
35 established by BDCP Objective MWNC1.1 All of the restoration and 4,800 acres of the protection
36 would happen during the first 10 years of Alternative 4 implementation, which would coincide
37 with the timeframe of water conveyance facilities construction and early implementation of
38 CM4. The remaining restoration would be spread over the following 30 years. Managed wetland
39 restoration is expected to include at least 320 acres in CZ 3, CZ 4, CZ 5, and CZ 6 (Figure 12-1) to
40 benefit sandhill crane, as stated in BDCP Objective GSHC1.3. The enhancement and protection
41 would be focused in Suisun Marsh, but could also occur in CZs with existing managed wetland
42 (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and CZ 7).
- 43 • *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in filling
44 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of
45 this loss cannot be quantified at this time, but the majority of the enhancement activity would
46 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.

1 Managed wetland adjacent to these tidal areas could be affected. The improvements would
2 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,
3 and along Steamboat and Sutter Sloughs.

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 4 would
9 permanently remove ~~5,749~~5,764 acres and temporarily remove ~~72-73~~ acres of managed wetland
10 through inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities.
11 ~~Seven-Twenty-two~~ acres of the permanent loss and ~~28-29~~ acres of the temporary loss would be
12 associated with construction of the water conveyance facilities (CM1). These near-term losses would
13 occur in various locations, but the majority would occur in Suisun Marsh and the lower Yolo Bypass
14 as tidal marsh is restored.

15 The construction or inundation loss of this special-status natural community would represent an
16 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural
17 community would be considered both a loss in acreage of a sensitive natural community and
18 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are
19 interspersed with small natural wetlands that would be regulated under Section 404. The
20 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres (CM3) of managed
21 wetland during the first 10 years of Alternative 4 implementation would fully offset the losses
22 associated with CM1, but would only partially offset the total near-term loss. Typical project-level
23 mitigation ratios (1:1 for protection) would indicate ~~7-22~~ acres of protection would be needed to
24 offset the ~~7-22~~ acres of loss associated with CM1; a total of ~~5,821~~5,837 acres of protection would be
25 needed to offset (i.e., mitigate) the ~~5,821~~5,837 acres of permanent and temporary loss from all near-
26 term actions. The combined protection and restoration proposed for managed wetland in the near-
27 term would fall ~~521-537~~ acres short of full replacement. However, the CM4 marsh restoration
28 activities that would be creating this loss would be simultaneously creating 2,000 acres of tidal
29 brackish emergent wetland and 8,850 acres of tidal freshwater emergent wetland in place of the
30 managed wetland in the near-term. This acreage would significantly exceed the number of acres of
31 managed wetland lost. Mitigation measures would also be undertaken to reduce the effects of
32 managed wetland loss on waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the
33 Yolo/Delta basins (Mitigation Measure 179b) if the protection and enhancement actions of CM3 and
34 CM10 were not sufficient to replace the value of managed wetlands for waterfowl in these basins.
35 Refer to the *General Terrestrial Biology Effects* discussion later in this section.

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 [Appendix 3.C, Avoidance and](#)
41 [Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in](#)
42 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~Appendix 3.C.~~

43 In spite of the managed wetland protection, restoration and avoidance measures contained in
44 Alternative 4, there would be a net reduction in the acreage of this special-status natural community

1 in the near-term. This would be an adverse effect when judged by the significance criteria listed
2 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland
3 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and
4 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect. Also, there are
5 other conservation actions contained in the BDCP (CM3 and CM11) that would improve
6 management and enhance existing habitat values, further offsetting the effects of managed wetland
7 loss on covered and noncovered special-status terrestrial species and on common species that rely
8 on this natural community for some life phase. As a result, there would be no adverse effect.

9 **Late Long-Term Timeframe**

10 At the end of the Plan period, ~~13,777~~13,792 acres of managed wetland natural community would be
11 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would
12 be restored. There would be a net permanent reduction in the acreage of this special-status natural
13 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal
14 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this
15 managed wetland.

16 **NEPA Effects:** Alternative 4 would result in a loss ~~13,777~~13,792 acres of managed wetland within
17 the study area; however, it would also protect and enhance 8,100 acres and restore 500 acres of this
18 habitat. In addition, Alternative 4 would restore 6,000 acres of tidal brackish emergent wetland and
19 24,000 acres of tidal freshwater emergent wetland that support similar ecological functions to those
20 of managed wetland. Therefore, there would be no adverse effect on managed wetland natural
21 community.

22 **CEQA Conclusion:**

23 **Near-Term Timeframe**

24 During the near-term timeframe ~~(the first 10 years of BDCP implementation)~~, Alternative 4 would
25 permanently remove ~~5,749~~5,764 acres and temporarily remove ~~72-73~~ acres of managed wetland
26 through inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities.
27 Seven acres of permanent loss and ~~28-29~~ acres of temporary loss would be associated with
28 construction of the water conveyance facilities (CM1) in various locations. The majority of the near-
29 term loss would be in Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

30 The construction or inundation loss of this special-status natural community would represent a
31 significant impact if it were not offset by other conservation actions. Loss of managed wetland
32 natural community would be considered both a loss in acreage of a sensitive natural community and
33 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and
34 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during
35 the first 10 years of Alternative 4 implementation would fully offset the losses associated with CM1,
36 but would only partially offset the total near-term loss. Typical project-level mitigation ratios (1:1
37 for protection) would indicate ~~7-22~~ acres of protection would be needed to offset the ~~7-22~~ acres of
38 loss associated with CM1; a total of ~~5,821~~5,837 acres of protection would be needed to offset (i.e.,
39 mitigate) the ~~5,821~~5,837 acres of permanent and temporary loss from all near-term actions. The
40 combined protection and restoration proposed for managed wetland in the near-term would fall
41 ~~521-537~~ acres short of full replacement. However, the CM4 marsh restoration activities that would
42 be creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent
43 wetland and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in

1 the near-term. This acreage would significantly exceed the number of acres of managed wetland
2 lost. Mitigation measures would also be undertaken to reduce the effects of managed wetland loss
3 on waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation
4 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to
5 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*
6 *Biology Effects* discussion later in this section (Section 12.3.3.9).

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*, and *AMM10 Restoration of Temporarily Affected*
10 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
11 habitats at work areas. The AMMs are described in detail in [Appendix 3.C, Avoidance and](#)
12 [Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in](#)
13 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

14 In spite of the managed wetland protection, restoration and avoidance measures contained in
15 Alternative 4, there would be a net reduction in the acreage of this special-status natural community
16 in the near-term. This would be a significant impact when judged by the significance criteria listed
17 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland
18 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and
19 8,850 acres of tidal freshwater emergent wetland) would offset this significant impact. Also, there
20 are other conservation actions contained in the BDCP (CM3 and CM11) that would improve
21 management and enhance existing habitat values, further offsetting the impacts of managed wetland
22 loss on covered and noncovered special-status terrestrial species and on common species that rely
23 on this natural community for some life phase. As a result, there would be a less-than-significant
24 impact.

25 **Late Long-Term Timeframe**

26 At the end of the Plan period, ~~13,777~~13,792 acres of managed wetland natural community would be
27 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would
28 be restored. There would be a net permanent reduction in the acreage of this special-status natural
29 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal
30 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this
31 managed wetland. Because these natural wetlands support similar ecological functions to those of
32 managed wetland, there would be a less-than-significant impact.

33 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 34 **Managed Wetland Natural Community**

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

- 42 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
43 result in an increase in the frequency, magnitude and duration of inundation of 931-2,612 acres

1 of managed wetland natural community. The methods used to estimate these inundation
2 acreages are described in ~~BDCP~~ Appendix 5.J, *Effects on Natural Communities, Wildlife, and*
3 *Plants, of the Draft BDCP*. The area more frequently affected by inundation would vary with the
4 flow volume that would pass through the newly constructed notch in the Fremont Weir. The
5 931-acre increase in inundation would be associated with a notch flow of 8,000 cubic feet per
6 second (cfs), and the 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-
7 related increases in flow through Fremont Weir would be expected in 30% of the years. Based
8 on the theoretical modeling that has been completed to-date, the largest acreages would be
9 associated with the Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private
10 managed wetlands south of Putah Creek. The anticipated change in management of flows in the
11 Yolo Bypass includes more frequent releases in flows into the bypass from the Fremont and
12 Sacramento Weirs, and in some years, later releases into the bypass in spring months (April and
13 May). With larger flows, the water depths may also increase over Existing Conditions. While the
14 managed wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more
15 frequent and extended inundation periods may make it more difficult to actively manage the
16 areas for maximum food production for certain species (waterfowl primarily) and may alter the
17 plant assemblages in some years. The effects of this periodic inundation on birds and other
18 terrestrial species are discussed later in this chapter. The additional inundation would not be
19 expected to reduce the acreage of managed wetland on a permanent basis. The extended
20 inundation would be designed to expand foraging and spawning habitat for Delta fishes.

- 21 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
22 increase in the frequency, magnitude and duration of inundation of an estimated 6 acres of
23 managed wetland. Specific locations for this restoration activity have not been identified, but
24 they would likely be focused in the south Delta area, along the major rivers and Delta channels.
25 The connection of these wetlands to stream flooding events would be beneficial to the ecological
26 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging
27 activity and refuge sites would be expanded into areas currently unavailable or infrequently
28 available to some aquatic species. The more frequent flooding would periodically interfere with
29 management activities associated with terrestrial species (primarily waterfowl) and may result
30 in changes in plant composition and management strategies over time.

31 In summary, 937–2,618 acres of managed wetland community in the study area would be
32 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation
33 measures (CM2 and CM5).

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

39 **CEQA Conclusion:** An estimated 937–2,618 acres of managed wetland community in the study area
40 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
41 Alternative 4. Managed wetland community would not be significantly impacted because periodic
42 inundation is already experienced by most of the land that would be affected. There could be
43 increased management problems and a long-term shift in plant species composition. The periodic
44 inundation would not be expected to result in a net permanent reduction in the acreage of this

1 community in the study area. Therefore, there would be a less-than-significant impact on the
2 community.

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

5 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
6 associated with changed water management is in effect, there would be new ongoing and periodic
7 actions associated with operation, maintenance and management of the BDCP facilities and
8 conservation lands that could affect managed wetland natural community in the study area. The
9 ongoing actions include changes in operation of upstream reservoirs, the diversion of Sacramento
10 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of
11 reserve areas. These actions are associated with CM1 and CM11 (see the impact discussion above for
12 effects associated with CM2). The periodic actions would involve access road and conveyance facility
13 repair, vegetation management at the various water conveyance facilities and habitat restoration
14 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
15 enhancement in accordance with natural community management plans. The potential effects of
16 these actions are described 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 H) would not result in the reduction in acreage
21 of the managed wetland natural community in the study area. Flow levels in the upstream rivers
22 would not change to the degree that water levels in adjacent managed wetlands would be
23 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not
24 result in a permanent reduction in the managed wetland community downstream of these
25 diversions. The majority of the managed wetlands below the diversions is not directly connected
26 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in
27 this natural community.
- 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 managed wetland
31 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
32 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff
33 control 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 managed wetland habitats would require
36 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.
37 Proper implementation of these measures would avoid permanent adverse effects on this
38 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 (*CM11 Natural Communities Enhancement and*
42 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
43 managed wetland natural community at or adjacent to treated areas. The hazard could be
44 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
45 onto the community, or direct discharge of herbicides to managed wetland areas being treated

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

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

- 21 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
22 communities within the Plan Area (CM11). For the managed wetland natural community, a
23 management plan would be prepared that specifies actions to improve the value of the habitats
24 for covered species. Actions would include control of invasive nonnative plant and animal
25 species, fire management, restrictions on vector control and application of herbicides, and
26 maintenance of infrastructure that would allow for movement through the community. The
27 enhancement efforts would improve the long-term value of this community for both special-
28 status and common species.
- 29 ● *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve
30 areas. *CM11 Natural Communities Enhancement and Management* (~~BDCP Chapter 3, Section~~
31 ~~3.4.11~~) describes this program and identifies applicable restrictions on recreation that might
32 adversely affect managed wetland habitat (see Chapter 3, Section 3.4.11 of the Draft BDCP and
33 Appendix D, Section D.3.2.5 of this RDEIR/SDEIS). BDCP also includes an avoidance and
34 minimization measure (AMM37) that further dictates limits on recreation activities that might
35 affect this natural community. Hunting would be the dominant activity in fall and winter
36 months, while fishing and hiking would be allowed in non-hunting months.

37 The various operations and maintenance activities described above could alter acreage of managed
38 wetland natural community in the study area through facilities maintenance, vegetation
39 management, and recreation. Activities could also introduce sediment and herbicides that would
40 reduce the value of this community to common and sensitive plant and wildlife species. Other
41 periodic activities associated with the Plan, including management, protection and enhancement
42 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
43 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
44 community. While some of these activities could result in small changes in acreage, these changes
45 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration*, *CM4*
46 *Tidal Natural Communities Restoration*, and protection and restoration actions associated with *CM3*

1 *Natural Communities Protection and Restoration*. Recreation activity effects would be minimized by
2 AMM37 (~~BDCP Appendix 3.C~~see Appendix 3.C. *Avoidance and Minimization Measures, of the Draft*
3 *BDCP*). The management actions associated with levee repair and control of invasive plant species
4 would also result in a long-term benefit to the species associated with managed wetland habitats by
5 improving water movement.

6 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
7 Alternative 4 would not result in a net permanent reduction in acreage of managed wetland natural
8 community within the study area. Therefore, there would be no adverse effect on this natural
9 community.

10 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
11 have the potential to create minor changes in total acreage of managed wetland natural community
12 in the study area, and could create temporary increases in turbidity and sedimentation. The
13 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting
14 could intermittently reduce the availability of this community to special-status and common wildlife
15 species. Implementation of environmental commitments and AMM2, AMM4, AMM5, and AMM37
16 would minimize these impacts, and other operations and maintenance activities, including
17 management, protection and enhancement actions associated with *CM3 Natural Communities*
18 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
19 create positive effects, including improved water movement in and adjacent to these habitats. Long-
20 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*
21 *Communities Restoration*, and protection and restoration actions associated with *CM3 Natural*
22 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural
23 community in the study area. Ongoing operation, maintenance and management activities would not
24 result in a net permanent reduction in this sensitive natural community within the study area.
25 Therefore, there would be a less-than-significant impact on the managed wetland natural
26 community.

27 **Other Natural Seasonal Wetland**

28 The other natural seasonal wetlands natural community encompasses all the remaining natural (not
29 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.
30 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area
31 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils
32 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area
33 are located along the Cosumnes River northeast of Thornton, and in the western extension of the
34 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh
35 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are
36 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure
37 12-1). The only BDCP conservation component that would potentially affect this natural community
38 is the seasonally inundated floodplain restoration conservation measure (CM5) (see Table 12-4-10).

1 **Table 12-4-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	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
TOTAL IMPACTS	0	0	0	0	0	2

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

Unk. = unknown

2

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

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

16 **NEPA Effects:** Alternative 4 conservation actions would not adversely affect other natural seasonal
17 wetland natural community because the small increase in periodic flooding of up to 2 acres would
18 not alter its function or general species makeup.

19 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study
20 area would be subjected to more frequent inundation from flood flows as a result of implementing
21 CM5 under Alternative 4. This community would not be significantly impacted because a small
22 increase in periodic flooding would not alter its ecological function or species composition. The
23 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 Alternative 4 are constructed and the stream flow regime
6 associated with changed water management is in effect, there would be new ongoing and periodic
7 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 modified operation of upstream reservoirs, the diversion of
10 Sacramento River flows in the north Delta, and reduced diversions from south Delta channels. These
11 actions are associated with CM1. The periodic actions would involve access road and conveyance
12 facility repair, vegetation management at the various water conveyance facilities and habitat
13 restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging, and
14 habitat enhancement in accordance with natural community management plans. The potential
15 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 H) 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 as required by
31 *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of
32 these measures would 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 (*CM11 Natural Communities Enhancement and*
36 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
37 the other natural seasonal wetland natural community at or adjacent to treated areas. The
38 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
39 stormwater onto the natural community, or direct discharge of herbicides to wetland areas
40 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
41 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
42 hazards to humans and the environment from use of various chemicals during maintenance
43 activities, including the use of herbicides. These commitments ~~are described in Appendix 3B,~~
44 including the commitment to prepare and implement spill prevention, containment, and
45 countermeasure plans and stormwater pollution prevention plans, ~~are described in Appendix~~

1 3B. Environmental Commitments, of the Draft EIR/EIS. Best management practices, including
2 control of drift and runoff from treated areas, and use of herbicides approved for use in
3 terrestrial or aquatic environments would also reduce the risk of affecting natural communities
4 adjacent to water 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 to the restoration activities planned as part
21 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 4 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 other natural seasonal wetland
30 natural community.

31 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
32 have the potential to create minor changes in total acreage of other natural seasonal wetland natural
33 community in the study area, and could create temporary increases in sedimentation. The activities
34 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of
35 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,
36 and other operations and maintenance activities, including management, protection and
37 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
38 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
39 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration
40 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and
41 protection actions associated with *CM3 Natural Communities Protection and Restoration* would
42 ensure that the ecological values provided by this small natural community would not decrease in
43 the study area. Ongoing operation, maintenance and management activities would not result in a net
44 permanent reduction in this natural community within the study area. Therefore, there would be a
45 less-than-significant impact on the other natural seasonal wetland natural community.

1 **Grassland**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 4 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 12-4-11). Full implementation of Alternative 4 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 at 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, *Biological Goals and Objectives, of the Draft BDCP* that would improve the value of grassland
21 natural community for terrestrial species. As explained below, with the protection, restoration and
22 enhancement of the amounts of habitat listed in the BDCP objectives, in addition to implementation
23 of AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be
24 less than significant for CEQA purposes.

1 **Table 12-4-11. Changes in Grassland Natural Community Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	46050 6	46050 6	158 151	158 151	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
TOTAL IMPACTS	1,348 1,394	2,516 2,562	397 390	431 424	385-1,277	514

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

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 ~~2,516~~2,562 acres and temporarily remove ~~431~~424 acres of grassland natural
8 community in the study area. These modifications represent approximately 4% of the 78,047 acres
9 of the community that is mapped in the study area. Approximately ~~5960~~% (~~1,745~~1,784 acres) of the
10 permanent and temporary losses would happen during the ~~first 10 years~~near-term time period of
11 Alternative 4 implementation, as water conveyance facilities are constructed and habitat restoration
12 is initiated. Grassland protection (2,000 acres), restoration (1,140 acres) and enhancement would
13 be initiated during the same period. By the end of the Plan period, 2,000 acres of this natural
14 community would be restored and 8,000 acres would be protected. The ~~BDCP beneficial effects~~
15 analysis for grassland (~~BDCP~~in Chapter 5, Section 5.4.11.2, *Beneficial Effects, of the Draft BDCP*)
16 indicates that 8,000 acres of grasslands would be protected in Conservation Zones 1, 2, 4, 5, 7, 8, and
17 11, and 2,000 acres of grassland would be restored. Grassland protection and restoration would
18 improve connectivity among habitat areas in and adjacent to the Plan Area, improve genetic

1 interchange among native species' populations, and contribute to the long-term conservation of
2 grassland-associated covered species.

3 The individual effects of each 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 4 water conveyance facilities
7 would permanently remove ~~460-506~~ acres and temporarily remove ~~158-151~~ acres of grassland
8 natural community. The permanent losses would occur where Intakes 2, 3, and 5 encroach on
9 the Sacramento River's east bank between Clarksburg and Courtland; ~~along the permanent~~
10 ~~transmission line corridor adjacent to Lambert Road~~; ~~the rerouting of Highway 160~~;
11 ~~construction of the intermediate forebay~~; ~~a reusable tunnel material storage site on Bouldin~~
12 ~~Island~~; at a permanent pipeline shaft access road on the east side of Bacon Island; and at various
13 permanent facility sites ~~south and west of~~around Clifton Court Forebay, including a reusable
14 tunnel material storage site, new canal connections from Clifton Court Forebay to the two
15 aqueducts, and in the forebay expansion area on the south side of the existing forebay. Most of
16 the permanent losses would be of ruderal and herbaceous grassland areas that exist in very
17 narrow bands adjacent to waterways, levees and roads (see Terrestrial Biology Mapbook ~~in~~
18 ~~Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS~~). Some of the
19 grassland lost at the sites of new canals south of Clifton Court Forebay is composed of larger
20 stands of ruderal and herbaceous vegetation and California annual grassland. The temporary
21 losses would be associated with construction of the pump stations and temporary access roads
22 along the Sacramento River; at work areas and barge offloading facility construction sites at the
23 south end of Bouldin Island, at the north end of Bacon Island, ~~and the south end of Venice Island~~
24 and at the northwest corner of Victoria Island; at temporary access road sites on ~~the north end~~
25 ~~of Staten Island and the northern and southern ends of Bacon Island and~~ the northwest corner
26 of Victoria Island; at temporary work areas on Mandeville and Bacon Islands; ~~and~~ at the
27 operable barrier construction site at the head of Old River, ~~and various locations around Clifton~~
28 ~~Court Forebay~~. These losses would take place during the near-term construction period.

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

- 44 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
45 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
46 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and

1 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could
2 involve excavation and grading in grassland areas to improve passage of fish through the
3 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be
4 permanently lost and another 239 acres could be temporarily removed. Most of the grassland
5 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of
6 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These
7 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland
8 removal along the side channels of the bypass could pose barriers to grassland species moving
9 within the bypass. These losses would occur primarily in the near-term timeframe.

- 10 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
11 footprints, implementation of CM4 would permanently inundate or remove 448 acres of
12 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the
13 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration
14 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on
15 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
16 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal and
17 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the
18 Cache Slough ROA are annual grassland with higher values.
- 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
20 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural
21 community. The construction-related losses would be considered a permanent removal of the
22 habitats directly affected. These losses would be expected to occur along the San Joaquin River
23 and other major waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily
24 composed of narrow bands and small patches of ruderal herbaceous grasses and forbs. This
25 activity is scheduled to start following construction of water conveyance facilities, ~~which is~~
26 ~~expected to take 10 years.~~
- 27 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
28 removal of small amounts of grassland natural community along 20 miles of river and sloughs.
29 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
30 activity would occur along waterway margins where grassland habitat stringers exist, including
31 along levees and channel banks. The improvements would occur within the study area on
32 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter
33 Sloughs.
- 34 ● *CM7 Riparian Natural Community Restoration*: Riparian natural community restoration would
35 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of
36 existing riparian areas and stream/river corridors, to benefit the movement and interchange of
37 special-status and common species that use these areas. Large tracts would be restored in
38 concert with floodplain restoration (CM5), while narrower bands would be developed as part of
39 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of
40 expanding woody riparian habitat, existing nonnative grassland would be removed. While
41 specific locations for these restoration activities have not been fully developed, use of
42 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost
43 through the course of Plan implementation. A majority of this activity would occur in the South
44 Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).

- 1 • *CM8 Grassland Natural Community Restoration*: The grassland natural community would be
2 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and
3 agricultural lands. Restoration would focus on CZ 1, CZ 8, and CZ 11, as proposed by BDCP
4 Objective GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the
5 diversity of grassland species (Objective GNC1.2). Some of the planned 2,000 acres of
6 restoration would occur around existing populations of giant garter snake in the east Delta and
7 the Yolo Bypass area.
- 8 • *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement
9 and management would include a wide range of activities designed to improve habitat
10 conditions in restored and protected lands associated with the BDCP. This measure also
11 promotes sound use of pesticides, vector control activities, invasive species control and fire
12 management in preserve areas. To improve the public's ability to participate in recreational
13 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The
14 location and extent of this system are not yet known, so the analysis of this activity is
15 programmatic. At the current level of planning, it is assumed that the trail system would be
16 located entirely in grassland habitats and would include up to 50 acres of habitat loss.
- 17 • *CM18. Conservation Hatcheries*: The BDCP includes a proposal to design and construct a
18 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of
19 this facility is not yet firmly established, but for planning purposes it has been assumed that it
20 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The
21 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous
22 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

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 ***Near-Term Timeframe***

27 During the near-term timeframe ~~(the first 10 years of BDCP implementation)~~, Alternative 4 would
28 affect the grassland natural community through CM1 construction losses (~~460-506~~ acres permanent
29 and ~~158-151~~ acres temporary), CM2 construction losses (388 acres permanent and 239 acres
30 temporary), CM11 recreational trail construction (13 acres permanent), CM18 fish hatchery
31 construction (35 acres permanent), and CM7 riparian habitat restoration (4 acres permanent).
32 These losses would occur along the eastern bank of the Sacramento River at intake sites, adjacent to
33 Clifton Court Forebay associated with forebay expansion, at various permanent and temporary
34 construction sites for barge unloading facilities and tunnel shaft sites through the central Delta, at
35 currently unspecified sites for hatchery and recreational trail construction and riparian restoration,
36 at fish passage construction sites in the northern Yolo Bypass, and along the east and west channels
37 within the Yolo Bypass. Approximately 448 acres of the inundation and construction-related losses
38 in habitat from CM4 would occur in the near-term. These tidal restoration losses would occur
39 throughout the ROAs mapped in Figure 12-1.

40 The construction losses of this natural community would not represent an adverse effect based on
41 the significance criteria used for this chapter because grassland is not considered a special-status or
42 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual
43 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of
44 numerous special-status plants and wildlife is well documented (see ~~BDCP~~ Chapter 3, *Conservation*

1 *Strategy, of the Draft BDCP*). The significance of losses in grassland habitat is, therefore, discussed in
2 more detail in species analyses later in this chapter. The combination of restoring 1,140 acres (CM8)
3 and protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of BDCP
4 implementation, and the commitment to restore temporarily affected grassland (397 acres) to its
5 pre-project condition within one year of completing construction as required by *AMM10 Restoration*
6 *of Temporarily Affected Natural Communities*, would offset this near-term loss, avoiding any loss in
7 the value of this habitat for special-status species. The restoration of grassland would include
8 protection in perpetuity, and the protected and restored habitat would be managed and enhanced to
9 benefit special-status and common wildlife species (CM3 and CM11). Typical project-level mitigation
10 ratios (2:1 for protection) would indicate that 3,4903,568 acres of protection would be needed to
11 offset (i.e., mitigate) the 1,7451,784 acres of combined permanent and temporary loss. The
12 combination of restoration and protection, along with the enhancement and management associated
13 with CM3 and CM11 contained in the BDCP, is designed to avoid a temporal lag in the value of
14 grassland habitat available to sensitive species.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,
17 *Reusable Tunnel Material*, and *Dredged Material*, and *AMM7 Barge Operations Plan*. All of these
18 AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
19 storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization](#)
20 [Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in Appendix D.](#)
21 [Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

22 **Late Long-Term Timeframe**

23 Implementation of Alternative 4 as a whole would result in less than 4% losses of grassland natural
24 community in the study area. These losses (2,5162,562 acres of permanent and 431-424 acres of
25 temporary loss) would be largely associated with construction of the water conveyance facilities
26 (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal marsh
27 restoration (CM4), and riparian habitat restoration (CM7). Inundation losses would occur through
28 the course of BDCP restoration activities at various tidal restoration sites throughout the study area.

29 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community
30 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur
31 primarily in CZ 1, CZ 8, and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay
32 areas. Temporarily affected grassland would also be restored following construction activity. The
33 2,000 acres of restoration associated with CM8, and the restoration of temporarily affected
34 grassland required by AMM10 (431-424 acres for Alternative 4) would not totally replace the
35 grassland acres lost through the Plan timeframe (2,9472,986 acres). There would be a permanent
36 loss of 516-562 acres of grassland in the study area. However, the combination of restoration,
37 protection and enhancement of grassland associated with Alternative 4 would improve the habitat
38 value of this community in the study area; there would not be an adverse effect on the grassland
39 natural community.

40 **CEQA Conclusion:**

41 **Near-Term Timeframe**

42 Alternative 4 would result in the loss of approximately 1,7451,784 acres of grassland natural
43 community due to construction of the water conveyance facilities (CM1), fish passage improvements

1 (CM2), riparian habitat restoration (CM7), recreational trail development (CM11), fish hatchery
2 construction (CM18), and inundation during tidal marsh restoration (CM4). The construction losses
3 would occur along the eastern bank of the Sacramento River at intake sites, adjacent to Clifton Court
4 Forebay associated with forebay expansion, at various permanent and temporary construction sites
5 for barge unloading facilities and tunnel shaft sites through the central Delta, at currently
6 unspecified sites for hatchery and recreational trail construction and riparian habitat restoration, at
7 fish passage improvement sites in the northern Yolo Bypass, and along the east and west channels
8 within the Yolo Bypass. Inundation losses would occur at various tidal restoration sites throughout
9 the study area. The construction losses would be spread across ~~a 10-year~~the near-term timeframe.

10 The construction losses of this natural community would not represent a significant impact based
11 on the significance criteria used for this chapter because grassland is not considered a special-status
12 or sensitive natural community. Nonetheless, these losses would be offset by planned restoration of
13 1,140 acres and protection of 2,000 acres of grassland natural community scheduled for the first 10
14 years of Alternative 4 implementation, and the restoration of temporarily affected grassland (397
15 acres for Alternative 4) as dictated by AMM10. Also, AMM1, AMM2, AMM6, and AMM7 would be
16 implemented to minimize impacts. Because of these offsetting near-term restoration and protection
17 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios
18 (2:1 for protection) would indicate that ~~3,4903,568~~ acres of protection would be needed to offset
19 (i.e., mitigate) the ~~1,7451,784~~ acres of loss. The combination of two approaches (protection and
20 restoration) contained in the BDCP conservation measures and avoidance and minimization
21 measures is designed to avoid a temporal lag in the value of grassland habitat available to special-
22 status species. The protection and restoration would be initiated at the beginning of Alternative 4
23 implementation to minimize any time lag in the availability of this habitat to special-status species.

24 ***Late Long-Term Timeframe***

25 At the end of the Plan period, ~~2,9472,986~~ acres of grassland natural community would be
26 permanently or temporarily removed by conservation actions, 2,000 acres would be restored and
27 8,000 acres would be protected. Temporarily affected areas would also be restored (~~431-424~~ acres
28 for Alternative 4). While there would be a net permanent reduction in the acreage of this natural
29 community within the study area (total loss of ~~516-562~~ acres), there would be an increase in the
30 value of grassland for special-status and common species in the study area through the combination
31 of conservation actions (CM3 and CM8) and avoidance and minimization measures (AMM1, AMM2,
32 AMM6, AMM7, and AMM10). Therefore, Alternative 4 would have a less-than-significant impact on
33 this natural community.

34 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 35 **Grassland Natural Community**

36 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
37 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
38 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
39 of grassland natural community at scattered locations, while CM5 would expose this community to
40 additional flooding as channel margins are modified and levees are set back to improve fish habitat
41 along some of the major rivers and waterways of the study area.

- 42 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
43 result in an increase in the frequency, magnitude and duration of inundation of 385–1,277 acres
44 of grassland natural community. The methods used to estimate this inundation acreage are

1 described in ~~BDCP~~ Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants, of the Draft*
2 ~~BDCP~~. The area more frequently affected by inundation would vary with the flow volume that
3 would pass through the newly constructed notch in the Fremont Weir. The 385-acre increase in
4 inundation would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur
5 at the 4,000 cfs flow regime. Plan-related increases in flow through Fremont Weir would be
6 expected in 30% of the years. The grassland community occurs throughout the bypass, including
7 a large acreage just below Fremont Weir in the north end of the bypass, in stringers along the
8 internal waterways of the bypass and in larger patches in the lower bypass. The anticipated
9 change in management of flows in the Yolo Bypass includes more frequent releases in flows into
10 the bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the
11 bypass in spring months (April and May). The modification of periodic inundation events would
12 not adversely affect grassland habitats, as they have persisted under similar high flows and
13 extended inundation periods. There is the potential for some change in grass species
14 composition as a result of longer inundation periods. 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 514 acres of grassland habitats. Specific
18 locations for this restoration activity have not been identified, but they would likely be focused
19 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The
20 increase in periodic stream flooding events would not adversely affect the habitat values and
21 functions of grassland natural community.

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

25 **NEPA Effects:** The grasslands in the Yolo Bypass and along river floodplains in the south Delta are
26 conditioned to periodic inundation from flood flows; therefore, periodic inundation would not result
27 in a net permanent reduction in the acreage of this community in the study area. Increasing periodic
28 inundation of grassland natural community in the Yolo Bypass and along south Delta waterways
29 would not constitute an adverse effect.

30 **CEQA Conclusion:** An estimated 899–1,791 acres of grassland natural community in the study area
31 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
32 Alternative 4. The grassland natural community is conditioned to periodic inundation; therefore,
33 periodic inundation would not result in a net permanent reduction in the acreage of this community
34 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass
35 and along south Delta waterways would have a less-than-significant impact on the community.

36 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,** 37 **Maintenance and Management Activities**

38 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
39 associated with changed water management is in effect, there would be new ongoing and periodic
40 actions associated with operation, maintenance and management of the BDCP facilities and
41 conservation lands that could affect grassland natural community in the study area. The ongoing
42 actions include modified operation of upstream reservoirs, the diversion of Sacramento River flows
43 in the north Delta, and reduced diversions from south Delta channels. These actions are associated
44 with CM1 (see Impact BIO-30 for effects associated with CM2). The periodic actions would involve

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

- 5 • *Modified river flows upstream of and within the study area and reduced diversions from south*
6 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
7 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
8 channels (associated with Operational Scenario H) would not result in the permanent reduction
9 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers
10 would not change such that the acreage of this community would be reduced on a permanent
11 basis. The grassland along rivers upstream of planned north Delta diversions is primarily
12 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination
13 and growth rather than on river levels. Similarly, increased diversions of Sacramento River
14 flows in the north Delta would not result in a permanent reduction in grassland natural
15 community downstream of these diversions. The reductions in flows below the intakes would
16 occur primarily in the wet months when the existing nonnative annual grasslands along river
17 levees are dormant, and like upstream grassland, this community is dependent on winter and
18 spring rains for germination and growth in the winter and spring months, not on river stage.
19 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create
20 a substantial change in grassland acreage in these areas. Reduced diversions from south Delta
21 channels would not create a reduction in 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 grassland habitats. This
25 activity could lead to increased soil erosion and runoff entering these habitats. These activities
26 would be subject to normal erosion and runoff control management practices, including those
27 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*
28 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within
29 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of
30 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper
31 implementation of 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 Community Enhancement and*
35 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
36 grassland natural community at or adjacent to treated areas. The hazard could be created by
37 uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the
38 natural community, or direct discharge of herbicides to grassland areas being treated for
39 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*
40 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and
41 the environment from use of various chemicals during maintenance activities, including the use
42 of herbicides. These commitments ~~are described in Appendix 3B~~, including the commitment to
43 prepare and implement spill prevention, containment, and countermeasure plans and
44 stormwater pollution prevention plans, ~~are described in Appendix 3B, Environmental~~
45 ~~Commitments, of the Draft EIR/EIS~~. Best management practices, including control of drift and
46 runoff from treated areas, and use of herbicides approved for use in terrestrial environments

1 would also reduce the risk of affecting natural communities adjacent to water conveyance
2 features and levees associated with restoration activities.

- 3 ● *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River
4 would include periodic dredging of sediments that might accumulate in front of intake screens.
5 The dredging could occur adjacent to grassland natural community. This activity should not
6 permanently reduce the acreage of grassland natural community because it is periodic in
7 nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with
8 low habitat value.
- 9 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
10 communities within the Plan Area (CM11). For the grassland natural community, a management
11 plan would be prepared that specifies actions to improve the value of the habitats for covered
12 species. Actions would include control of invasive nonnative plant and animal species, fire
13 management, restrictions on vector control and application of herbicides, and maintenance of
14 infrastructure that would allow for movement through the community. The enhancement efforts
15 would improve the long-term value of this community for both special-status and common
16 species.

17 The various operations and maintenance activities described above could alter acreage of grassland
18 natural community in the study area through changes in flow patterns and changes in periodic
19 inundation of this community. Activities could also introduce sediment and herbicides that would
20 reduce the value of this community to common and sensitive plant and wildlife species. Other
21 periodic activities associated with the Plan, including management, protection and enhancement
22 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
23 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
24 community. While some of these activities could result in small changes in acreage, these changes
25 would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*
26 *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The
27 management actions associated with levee repair, periodic dredging and control of invasive plant
28 species would also result in a long-term benefit to the species associated with grassland habitats by
29 improving water movement in adjacent waterways and by eliminating competitive, invasive species
30 of plants.

31 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
32 Alternative 4 would not result in a net permanent reduction in grassland natural community within
33 the study area. Therefore, there would be no adverse effect on this natural community.

34 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
35 have the potential to create minor changes in total acreage of grassland natural community in the
36 study area, and could create temporary increases sedimentation. The activities could also introduce
37 herbicides periodically to control nonnative, invasive plants. Implementation of environmental
38 commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts, and other
39 operations and maintenance activities, including management, protection and enhancement actions
40 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
41 *Communities Enhancement and Management*, would create positive effects, including reduced
42 competition from invasive, nonnative plants in these habitats. Long-term restoration activities
43 associated with *CM8 Grassland Natural Community Restoration* and protection actions associated
44 with *CM3 Natural Communities Protection and Restoration* would increase the value of this natural
45 community in the study area. Ongoing operation, maintenance and management activities would not

1 result in a net permanent reduction in this natural community within the study area. Therefore,
2 there would be a less-than-significant impact on the grassland natural community.

3 **Inland Dune Scrub**

4 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes
5 associated with river and estuarine systems. In the study area, the inland dune scrub community
6 consists of remnants of low-lying ancient stabilized dunes related to the Antioch Dunes formation
7 located near the town of Antioch (CZ 10; see Figure 12-1). While inland dune scrub is within the
8 BDCP Plan Area, none of the Alternative 4 conservation measures or covered actions is expected to
9 affect this community.

10 **Cultivated Lands**

11 Cultivated lands is the major land cover type in the study area (487,106 acres, see Table 12-1 [in the](#)
12 [Draft EIR/EIS](#)). The Delta, the Yolo Bypass and the Cache Slough drainage are dominated by various
13 types of agricultural activities, with crop production the dominant element (see Figure 12-1). Major
14 crops and cover types in agricultural production include grain and hay crops (wheat, oats and
15 barley), field crops (corn, beans and safflower), truck crops (tomatoes, asparagus and melons),
16 pasture (alfalfa, native and nonnative pasture), rice, orchards, and vineyards. Tables 12-2 and 12-3
17 [in the Draft EIR/EIS](#) list special-status wildlife species supported by cultivated lands.

18 The effects of Alternative 4 on cultivated lands are discussed from various perspectives in this
19 document. Chapter 14, *Agricultural Resources*, [of the Draft EIR/EIS](#) includes a detailed analysis of
20 cropland conversion as it relates to agricultural productivity. Many of the discussions of individual
21 terrestrial plant and wildlife species in this chapter also focus on the relevance of cultivated land
22 loss. Because cultivated lands is not a natural community and because the effects of its loss are
23 captured in the individual species analyses, there is no separate analysis of this land cover type
24 presented here. Table 14-8 in Chapter 14 [of the Draft EIR/EIS](#) provides a comparison of important
25 farmland losses that would result from construction of CM1 water conveyance facilities for each
26 alternative, and Table 14A-1 in Appendix 14A, *Individual Crop Effects as a Result of BDCP Water*
27 *Conveyance Facility Construction*, [of the Draft EIR/EIS](#) provides a similar comparison for losses of
28 individual crops. ~~Table 12-ES-1 in this chapter's Summary of Effects identifies the total cultivated~~
29 ~~land loss for all project alternatives.~~ For Alternative 4, the total loss (permanent and temporary) is
30 estimated to be ~~57,4488,324~~ acres. The majority of the permanent loss would be associated with
31 habitat restoration activities, specifically Yolo Bypass fisheries enhancement (CM2; 629 acres), tidal
32 marsh restoration (CM4; 39,565 acres), floodplain restoration (CM5; 2,087 acres), riparian natural
33 community restoration (CM7; 4,553 acres), grassland restoration (CM8; 2,000 acres) and nontidal
34 marsh restoration (CM10; 1,950 acres). Construction of the modified tunnel and associated water
35 conveyance facilities (CM1) would permanently remove ~~3,7684,588~~ acres of cultivated lands.

36 **Developed Lands**

37 Additional lands in the study area that were not designated with a natural community type have
38 been characterized as developed lands (90,660 acres). Developed lands include lands with
39 residential, industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and
40 other transportation facilities (see Figure 12-1 [in the Draft EIR/EIS](#) and the Terrestrial Biology
41 Mapbook [in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS](#)). Developed
42 lands support some common plant and wildlife species, whose abundance and species richness vary
43 with the intensity of development. One special-status species, the giant garter snake, is closely

1 associated with a small element of developed lands; specifically, embankments and levees near
2 water that are covered with riprap provide giant garter snake habitat.

3 As with cultivated lands, no effort has been made to analyze the effects of Alternative 4 conservation
4 measures on this land cover type because it is not a natural community. The effects of its conversion
5 are discussed in Chapter 13, *Land Use, of the Draft EIR/EIS*. Where the loss of developed lands may
6 affect individual special-status species or common species, the impact analysis is contained in that
7 species discussion.

1 **Wildlife Species**

2 **Vernal Pool Crustaceans**

3 This section describes the effects of Alternative 4, including water conveyance facilities construction
4 and implementation of other conservation components, on vernal pool crustaceans (California
5 linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp, vernal pool
6 fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects for the
7 vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and uplands
8 that display characteristic vernal pool and swale visual signatures that have not been significantly
9 affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded
10 vernal pool complex, which consists of low-value ephemeral habitat ranging from areas with vernal
11 pool and swale visual signatures that display clear evidence of significant disturbance due to
12 plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural
13 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the
14 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and
15 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands
16 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included
17 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that
18 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool
19 plants, but which do not include topographic depressions that are characteristic of vernal pool
20 crustacean habitat.

21 Construction and restoration associated with Alternative 4 conservation measures would result in
22 permanent losses (see Table 12-4-12) and indirect conversions of vernal pool crustacean modeled
23 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is
24 restored in the Plan Area. Full implementation of Alternative 4 would also include the following
25 conservation actions over the term of the BDCP to benefit vernal pool crustaceans ([BDCP-see](#)
26 [Chapter 3, Conservation Strategy, of the Draft BDCP](#)).

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

39 As explained below, with the restoration or protection of these amounts of habitat, in addition to
40 implementation of AMMs, impacts on vernal pool crustaceans would not be adverse for NEPA
41 purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	824	824	161	161	NA	NA
	Low-value	7	7	2	2	NA	NA
Total Impacts CM1		1531	1531	183	183	NA	NA
CM2-CM18 ^b	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2-CM18		201	372	0	0	0-4	0
TOTAL IMPACTS		21623 2	38740 3	183	183	0-4	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

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

6 Alternative 4 conservation measures would result in the direct, permanent loss of up to ~~387,403~~
7 acres of modeled vernal pool crustacean habitat from conveyance facilities construction (CM1) and
8 tidal restoration (CM4). In addition, the conservation measures could result in the indirect
9 conversion due to hydrologic changes of an additional ~~145,176~~ acres of vernal pool crustacean
10 habitat (~~98,131~~ acres of high-value habitat and ~~47,45~~ acres of low-value habitat) from conveyance
11 facilities construction (CM1) and based on the hypothetical footprints for tidal restoration (CM4).
12 Construction of the water conveyance facilities and restoration activities may result in the
13 modification of hardpan and changes to the perched water table, which could lead to alterations in
14 the rate, extent, and duration of inundation of nearby vernal pool crustacean habitat. USFWS
15 typically considers construction within 250 feet of vernal pool crustacean habitat to constitute a
16 possible conversion of crustacean habitat unless more detailed information is provided to further
17 refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer was
18 applied to the water conveyance facilities work areas where surface and subsurface disturbance
19 activities would take place and to restoration hypothetical footprints. Habitat enhancement and
20 management activities (CM11), which include disturbance or removal of nonnative vegetation, could
21 result in local adverse habitat effects.

1 Alternative 4 would also result in impacts on critical habitat for Conservancy fairy shrimp (248
2 acres), vernal pool fairy shrimp (~~462-465~~ acres), and vernal pool tadpole shrimp (270 acres). The
3 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of the effects on critical
4 habitat for Conservancy fairy shrimp and vernal pool tadpole shrimp. Vernal pool fairy shrimp
5 critical habitat would also be affected by CM4 in this same area and would be affected by
6 conveyance facilities construction (CM1) west of Clifton Court Forebay. *AMM12 Vernal Pool*
7 *Crustaceans* would ensure that there would be no adverse modification of the primary constituent
8 elements of critical habitat for these species in association with restoration projects in CZ 1 and CZ
9 11.

10 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
11 where restoration may occur, actual effects are expected to be lower because sites would be selected
12 and restoration projects designed to minimize or avoid effects on the covered vernal pool
13 crustaceans. As specified in *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali Seasonal*
14 *Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal restoration
15 projects and other covered activities would be designed such that no more than a total of 10 wetted
16 acres of vernal pool crustacean habitat are permanently lost. AMM12 would also ensure that no
17 more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected by alterations to
18 hydrology resulting from adjacent BDCP covered activities, in particular tidal restoration. *AMM30*
19 *Transmission Line Design and Alignment Guidelines* would ensure that ~~temporary~~ transmission lines
20 avoid removal of ~~wetted acres of vernal pools and alkali seasonal wetlands~~ wetted acres of aquatic
21 habitats to the maximum extent practicable. The term *wetted acres* refers to an area that would be
22 defined by the three parameter wetland delineation method used by the U.S. Army Corps of
23 Engineers to determine the limits of a wetland, which involve an evaluation of wetland soil,
24 vegetation, and hydrology characteristics. This acreage differs from vernal pool complex acreages in
25 that a vernal pool complex is composed of individual wetlands (vernal pools) and those upland
26 areas that are in between and surrounding them, which provide the supporting hydrology (surface
27 runoff and groundwater input), organic and nutrient inputs, and refuge for the terrestrial phase of
28 some vernal pool species.

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

- 31 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
32 result in the permanent and temporary combined loss of approximately ~~33-34~~ acres of vernal
33 pool crustacean habitat, composed of ~~24-25~~ acres of high-value and 9 acres of low-value habitat
34 (Table 12-4-12). The construction of the conveyance facilities would result in the permanent
35 loss of one vernal pool fairy shrimp CNDDDB occurrence as a result of the expansion of Clifton
36 Court Forebay. In addition, conveyance facility construction could result in the indirect
37 conversion of ~~10-41~~ acres of ~~modeled high quality~~ vernal pool crustacean habitat in the vicinity
38 of Clifton Court Forebay. The indirect effects would result from the construction of ~~temporary~~
39 permanent transmission ~~lines and from lines, from~~ the storage of RTM, and permanent access
40 roads. ~~The affected areas consist of 8 acres of high-quality habitat and 2 acres of low-quality~~
41 ~~habitat and T~~here are records of vernal pool fairy shrimp and midvalley fairy shrimp in the
42 vicinity of these areas (California Department of Fish and Game 2012). Alternative 4 would also
43 result in the permanent loss of ~~178-195~~ acres ~~and temporary impacts on 14 acres~~ of critical
44 habitat for vernal pool fairy shrimp. The permanent impacts on critical habitat are associated
45 with the ~~a~~ RTM disposal areas and an associated access road west of Clifton Court Forebay (~~173~~
46 177 acres), a new transmission line (15 acres), and upgrades to a permanent access road just

1 south of this area (5.3 acres). The RTM disposal areas have been mapped by the BDCP as
2 mostly cultivated lands with the more eastern portion mapped as grasslands. An existing farm
3 road would serve as the permanent access roads, so there likely would be no minimal
4 disturbance to vernal pool crustacean habitat associated with any improvements to this road.
5 ~~The 14 acres of temporary impacts are associated with a temporary transmission line between~~
6 ~~Byron Highway and Clifton Court Forebay. Approximately half of this area is mapped by the~~
7 ~~BDCP as vernal pool complex. AMM12 Vernal Pool Crustaceans would ensure that there would be~~
8 ~~no adverse modification of the primary constituent elements of critical habitat for these species.~~
9 AMM30 Transmission Line Design and Alignment Guidelines would ensure that temporary
10 transmission lines are designed to avoid removal of ~~wetted acres of vernal pools and alkali~~
11 ~~seasonal wetlands aquatic habitats to the maximum extent feasible.~~

- 12 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
13 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,
14 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool
15 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale
16 visual signatures that display clear evidence of significant disturbance due to plowing, disking,
17 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions
18 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
19 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery of
20 these habitats found that they appear to generally have low densities. However, areas mapped
21 as degraded vernal pool complex may still provide habitat for vernal pool crustaceans as
22 evidenced by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California
23 linderiella occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and
24 Game 2012). Helm (1998) notes that many vernal pool crustaceans can occur in degraded
25 vernal pool habitats and artificial habitats. In CZ 2 and CZ 4, there are several records of covered
26 vernal pool crustaceans occurring outside of modeled habitat in areas that appear to be road
27 side ditches. So though degraded vernal pool complexes may not represent botanically diverse
28 vernal pools they still can provide habitat for vernal pool crustaceans and thus the loss of 372
29 acres of degraded vernal pool complex may result in the loss of occupied vernal pool crustacean
30 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of
31 vernal pool crustacean habitat, which consist of 90 acres of high-value and 45 acres of low-value
32 habitat. The hypothetical restoration footprints overlap with a CNDDDB record for vernal pool
33 fairy shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under
34 Alternative 4 would also result in impacts on critical habitat for Conservancy fairy shrimp (248
35 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). AMM12
36 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the
37 primary constituent elements of critical habitat for these species.

- 38 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
39 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
40 vernal pool complex would benefit vernal pool crustaceans (Table 12-4-12). A variety of habitat
41 management actions included in CM11 that are designed to enhance wildlife values in BDCP-
42 protected habitats may result in localized ground disturbances that could temporarily affect
43 vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative
44 vegetation and road and other infrastructure maintenance, are expected to have minor effects
45 on vernal pool crustacean habitat and are expected to result in overall improvements to and
46 maintenance of vernal pool crustacean habitat values over the term of the BDCP. These effects

1 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
2 the AMMs listed below.

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 impact conclusions are
5 also included. Table 12-4-13 was prepared to further analyze BDCP effects on vernal pool
6 crustaceans using wetted acres of habitat in order to compare the effects of this alternative with the
7 effect limits established in ~~BDCP~~ Chapter 3, Section 3.3, *Biological Goals and Objectives, of the Draft*
8 *BDCP* and *AMM12 Vernal Pool Crustaceans*, which are measured in wetted acres of habitat. Wetted
9 acres were estimated by using the BDCP’s assumption that restored vernal pool complexes would
10 have a 15% density of vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would
11 constitute vernal pools and the remaining 85 acres supporting uplands). Based on an informal
12 evaluation of aerial photographs of the Plan Area it is likely that the actual densities within the Plan
13 Area are approximately 10%, but the 15% density value was chosen as a conservative estimate for
14 determining effects.

15 **Table 12-4-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 4**
16 **(acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 4 Impact ^b	CM1 ^e	5.05.1	5.05.1	1.56.2	1.56.2
	CM4 ^{cd}	30.2	55.8	11.0	20.3
Total		35.32	60.98	12.517.2	21.826.5

^a Because roughly half of the impacts would 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.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-4-12 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^e ~~The temporary impacts from transmission line construction associated with CM1 would be zero because the commitment in AMM30, which calls for temporary transmission lines to avoid removal of alkali seasonal wetland and vernal pool wetted acres. This would lower CM1 impacts to 2.3 acres.~~

^{cd} These impacts are based on the hypothetical restoration footprints and would 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.

17

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 or restoration in an appropriate timeframe to ensure that the effects of
22 construction would not be adverse under NEPA and would be less than significant under CEQA.
23 Table 12-4-~~13~~ 12 lists the impacts on modeled vernal pool crustacean habitat that is based on the
24 natural community mapping done within the study area. The impacts from tidal natural
25 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual
26 impacts on vernal pool crustacean habitat considering the BDCP’s commitment to design projects to
27 minimize or avoid effects on covered vernal pool crustaceans (see AMM12 and AMM30). As seen in

1 Table 12-4-13, Alternative 4 would not meet the Plan's near-term biological goals and objectives for
2 direct loss and indirect conversion unless near-term projects are designed to ensure that they do not
3 exceed these impact limits.

4 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
5 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
6 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 5.1
7 wetted acres of vernal pool crustacean habitat (or ~~33-34~~ acres of vernal pool complex) should be
8 restored and ~~13-22.6~~ wetted acres (or ~~87-1500~~ acres of vernal pool complex) protected to mitigate
9 the CM1 direct and indirect effects on vernal pool crustacean habitat. ~~However, with the~~
10 implementation of AMM30 the effects on ~~wetted acres of vernal pool crustacean habitat from CM1~~
11 ~~would be reduced by approximately 2.7 acres (18 acres of modeled vernal pool crustacean~~
12 ~~habitat) aquatic habitat would be avoided to the maximum extent feasible by redesigning during the~~
13 ~~designing of the temporary~~ transmission line west of Clifton Court Forebay. Assuming that the BDCP
14 would apply the impact limits presented in Table 12-4-13 and implement AMM30, direct impacts on
15 wetted vernal pools resulting from tidal restoration in the near-term could not exceed 2.7 acres of
16 direct effects on wetted vernal pool crustacean habitat would have to be avoided and indirect
17 impacts from tidal restoration could not exceed 9.53.8 wetted acres of indirect effects (10 acre limit
18 minus the 6.2 acres from CM1). The impacts based on the hypothetical tidal restoration footprints
19 would exceed these limits. When and if these limits are met, the BDCP would need to restore up to
20 5.1 wetted acres (~~33-34~~ acres of vernal pool complex) and protect up to 30 wetted acres (2:1
21 protection for 5.1 acres of direct and 10 acres of indirect impact) (200 acres of vernal pool complex)
22 in the near-term to offset the effects of CM1 and CM4.

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

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

35 The species-specific biological goals and objectives would also inform the near-term protection and
36 restoration efforts. These Plan goals represent performance standards for considering the
37 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
38 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
39 habitat.

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, AMM10 Restoration of Temporarily Affected Natural Communities, AMM12 Vernal Pool*

1 *Crustaceans, AMM30 Transmission Line Design and Alignment Guidelines, and AMM37 Recreation. All*
2 *of these AMMs include elements that avoid or minimize the risk of affecting habitats and species*
3 *adjacent to work areas. The AMMs are described in detail in [Appendix 3.C, Avoidance and](#)*
4 *[Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in](#)*
5 *[Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)*

6 **Late Long-Term Timeframe**

7 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
8 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
9 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-13 and discussed above, the effects
10 of CM1 alone would be ~~within t~~generally within the near-term limits, but overall Alternative 4
11 would not meet the Plan's late long-term biological goals and objectives for direct and indirect
12 effects unless tidal restoration projects are designed to ensure that that they do not exceed these
13 impact limits.

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

- 21 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 22 • Protecting the range of inundation characteristics that are currently represented by vernal pool
23 throughout the Plan Area (Objective VPNC1.4)
- 24 • Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
25 VPC1.1)

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

31 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 4 would not be
32 adverse under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal
33 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation
34 ratios described above. In the absence of other conservation actions, the modification of vernal pool
35 crustacean habitat and potential mortality of a special-status species resulting from Alternative 4 in
36 the late long-term would represent an adverse effect. However, the BDCP has committed to impact
37 limits for vernal pool crustacean habitat and to habitat protection, restoration, management, and
38 enhancement associated with CM3, CM9, and CM11. This habitat protection, restoration,
39 management and enhancement would be guided by species-specific goals and objectives, and by
40 AMM1-AMM6, AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the
41 ~~period of construction~~BDCP permit term. Considering these commitments, losses and conversion of
42 vernal pool crustacean habitat under Alternative 4 would not be an adverse effect.

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 impacts of
6 construction would be less than significant. Table 12-4-12 above lists the impacts on modeled vernal
7 pool crustacean habitat that is based on the natural community mapping done within the study area.
8 The impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints
9 and do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's
10 commitment to design restoration projects to minimize or avoid effects on covered vernal pool
11 crustaceans (see AMM12 and AMM30). As seen in Table 12-4-13, Alternative 4 would not meet the
12 Plan's near-term biological goals and objectives for direct and indirect effects unless near-term tidal
13 restoration projects are designed to ensure that they do not exceed these impact limits.

14 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
15 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
16 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 5.1
17 wetted acres of vernal pool crustacean habitat (or ~~33-34~~ acres of vernal pool complex) should be
18 restored and ~~13-22.6~~ wetted acres (or ~~87-151~~ acres of vernal pool complex) protected to mitigate
19 the CM1 direct and indirect effects on vernal pool crustacean habitat. ~~However, w~~With the
20 implementation of AMM30 the effects on aquatic habitat would be avoided to the maximum extent
21 feasible during the designing of wetted acres of vernal pool crustacean habitat from CM1 would be
22 reduced by approximately 2.7 acres (18 acres of modeled vernal pool crustacean habitat) by
23 redesigning the temporary the transmission line west of Clifton Court Forebay. Assuming that the
24 BDCP would apply the impact limits presented in Table 12-4-13 and implement AMM30, direct
25 impacts on wetted vernal pools resulting from tidal restoration in the near-term ~~could not exceed~~
26 2.7 acres of direct effects on wetted vernal pool acreage would have to be avoided and indirect
27 impacts could not exceed 9.53.8 wetted acres of indirect effects. The impacts based on the
28 hypothetical tidal restoration footprints would exceed these limits. When and if these limits are met,
29 the BDCP would need to restore up to 5.1 wetted acres (~~33-34~~ acres of vernal pool complex) and
30 protect up to 30 wetted acres (200 acres of vernal pool complex) in the near-term to offset the
31 effects of CM1 and CM4.

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

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

1 The species-specific biological goals and objectives would also inform the near-term protection and
2 restoration efforts. These Plan goals represent performance standards for considering the
3 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
4 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
5 habitat.

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*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool*
11 *Crustaceans*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*. All
12 of these AMMs include elements that avoid or minimize the risk of affecting habitats and species
13 adjacent to work areas. The AMMs are described in detail in [Appendix 3.C, Avoidance and](#)
14 [Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in](#)
15 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

16 The natural community restoration and protection activities are expected to be concluded in the
17 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on
18 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
19 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion
20 that the near-term effects of Alternative 4 would be less than significant under CEQA.

21 ***Late Long-Term Timeframe***

22 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
23 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
24 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-13, the effects of CM1 alone would
25 ~~be be generally within the well within the~~ near-term limits, but overall Alternative 4 would not meet
26 the Plan's late long-term biological goals and objectives for direct and indirect effects unless ~~near-~~
27 ~~term~~ tidal restoration projects are designed to ensure that that they do not exceed these impact
28 limits.

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

- 36 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 37 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
38 throughout the Plan Area (Objective VPNC1.4)
- 39 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
40 VPC1.1)

41 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, [Effects on Covered Wildlife](#)
42 [and Plant Species, of the Draft BDCP](#)) estimates that the restoration and protection actions discussed

1 above, as well as the restoration and protection of alkali seasonal wetlands that could overlap with
2 the species model, could result in the restoration of 51 acres and the protection of 608 acres of
3 modeled habitat for vernal pool crustaceans.

4 The effects on vernal pool crustacean habitat from Alternative 4 would represent an adverse effect
5 as a result of habitat modification of a special-status species and potential for direct mortality in the
6 absence of other conservation actions. However, the BDCP has committed to impact limits for vernal
7 pool crustacean habitat and to habitat protection, restoration, management and enhancement
8 associated with CM3, CM9, and CM11. These conservation activities would be guided by species-
9 specific goals and objectives, and by AMM1–AMM6, AMM10, AMM12, AMM30, and AMM37, which
10 would be in place throughout the time ~~period of construction~~ BDCP permit term. Considering these
11 commitments, Alternative 4 over the term of the BDCP would not result in a substantial adverse
12 effect through habitat modifications and would not substantially reduce the number or restrict the
13 range of vernal pool crustaceans. Therefore, Alternative 4 would have a less-than-significant impact
14 on vernal pool crustaceans.

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

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

21 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
22 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-
23 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could
24 result in the inadvertent release of sediment and hazardous substances into this habitat. These
25 potential effects would be avoided and minimized through AMM1–AMM6, which would be in effect
26 throughout the ~~Plan's construction phase~~ BDCP permit term. Vernal pool crustaceans and their
27 habitat could be periodically indirectly affected by maintenance activities at water conveyance
28 facilities. Embankment maintenance activities around Clifton Court Forebay could result in the
29 inadvertent discharge of sediments and hazardous materials into vernal pool crustacean habitat that
30 occurs along the southern and western boundaries of the forebays. These potential effects would be
31 avoided and minimized through AMM1–AMM6, which would be in effect throughout the ~~term of the~~
32 ~~Plan~~ BDCP permit term. The indirect effects of Alternative 4 on vernal pool crustacean habitat would
33 not be adverse under NEPA.

34 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
35 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in
36 the vicinity of construction and restoration areas, and maintenance activities. These potential
37 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would
38 be in effect throughout the ~~construction phase~~ BDCP permit term. The indirect impacts of Alternative
39 4 would be less than significant under CEQA.

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

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

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

17 **CEQA Conclusion:** Alternative 4 would periodically inundate at most 4 acres of vernal pool
18 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is
19 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland
20 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is
21 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 would not typically affect
23 the 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 vernal pool crustaceans and would thus result in
26 less-than-significant impacts on the species.

27 **Valley Elderberry Longhorn Beetle**

28 The habitat model used to assess the effects for valley elderberry longhorn beetle is based on
29 riparian habitat and nonriparian habitat (vernal pool complexes and grasslands within 200 feet of
30 channels). Construction and restoration associated with Alternative 4 conservation measures would
31 result in both temporary and permanent losses of valley elderberry longhorn beetle modeled habitat
32 as indicated in Table 12-4-14. The majority of the losses would take place over an extended period
33 of time as the restoration conservation measures are being implemented. In addition, an estimated
34 [107](#) elderberry shrubs [that were previously mapped by DWR in the DHCCP Conveyance Planning](#)
35 [Area](#) could be impacted by the Alternative 4 conveyance alignment (CM1). Full implementation of
36 Alternative 4 would also include the following conservation actions over the term of the BDCP to
37 benefit valley elderberry longhorn beetle ([BDCP-see](#) Chapter 3, *Conservation Strategy, of the Draft*
38 [BDCP](#)).

- 39 ● Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the
40 species (Objective VELB1.1).
- 41 ● Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective
42 VELB1.2).
- 43 ● Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7).

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

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

8 **Table 12-4-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**
9 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	3442	3442	3031	3031	NA	NA
	Non-riparian	227211	227211	6286	6286	NA	NA
Total Impacts CM1		264253	264253	92117	92117	NA	NA
CM2-CM18	Riparian	381	678	76	111	44-80	266
	Non-riparian	142	311	94	108	103-244	287
Total Impacts CM2-CM18		523	989	170	219	161-325	553
TOTAL IMPACTS		784776	1,250,242	262287	341336	161-325	553

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

10

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

12 Alternative 4 conservation measures would result in the permanent and temporary loss combined
13 of up to ~~1,561,578~~ acres of modeled valley elderberry longhorn beetle habitat (~~853,862~~ acres of
14 riparian habitat and ~~708,716~~ acres of nonriparian habitat), and an estimated ~~7-10~~ elderberry shrubs
15 from CM1, which represent potential habitat for the species (Table 12-4-14). Due to the limitation of
16 the habitat suitability model, all of these effects are assumed to be a large overestimate of the true
17 effect on potential valley elderberry longhorn beetle habitat. Conservation measures that would
18 result in these losses are conveyance facilities and transmission line construction, and establishment
19 and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal
20 habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
21 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could

1 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
2 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
3 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term
4 habitat protection and restoration contained in the Plan and implementation of AMMs committed to
5 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under
6 CEQA. Each of these activities is described below.

- 7 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
8 result in the permanent and temporary combined loss of approximately ~~353~~370 acres of
9 modeled valley elderberry longhorn beetle habitat, composed of ~~64~~73 acres of riparian habitat
10 and ~~289~~297 acres of nonriparian habitat (Table 12-4-14). In addition, an estimated ~~7~~10 shrubs
11 could be removed as a result of conveyance facilities construction. As noted in Section 12.3.2.3
12 Methods Used to Assess Species Effects, elderberry shrubs were mapped in the DHCCP
13 Conveyance Planning Area where accessible and thus the entire footprint of CM1 was not
14 surveyed. In many cases, the data collected did not always specify the number of shrubs
15 observed but rather the size class and a range of stem numbers. The exact number of shrubs to
16 be impacted would be determined during pre-construction surveys of the footprints of the
17 conveyance facility and associated work areas as part of the implementation of *AMM15 Valley*
18 *Elderberry Longhorn Beetle*. Most of these impacts are associated with the intake and forebay
19 construction in the north delta. There are no records of valley elderberry longhorn beetle within
20 these impact areas. The portion of the above impacts that result from temporary habitat loss
21 includes ~~92~~117 acres of modeled valley elderberry longhorn beetle habitat (~~30~~31 acres
22 riparian and ~~62~~86 acres nonriparian habitat). Elderberry shrubs could be affected from ground-
23 disturbing activities associated with conveyance construction footprints, reusable tunnel
24 material storage areas, geotechnical boring areas, temporary 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 136 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 170 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 CNDDDB 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 listed below.
- 16 • Operations and maintenance: Post-construction operation and maintenance of the above-
17 ground water conveyance facilities and restoration infrastructure could result in ongoing but
18 periodic disturbances that could affect valley elderberry beetle. Maintenance activities would
19 include vegetation management, levee and structure repair, and re-grading of roads and
20 permanent work areas could affect elderberry shrubs occupied by the species. These effects,
21 however, would be reduced by AMMs listed 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 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 and would be less than significant under CEQA.
30 Alternative 4 would result in permanent and temporary impacts on 1,0461,063 acres of modeled
31 habitat (521-530 acres of riparian and 525-533 acres of nonriparian) for valley elderberry longhorn
32 beetle in the study area in the near-term. These effects would result from the construction of the
33 water conveyance facilities (CM1, 64-73 acres of riparian and 289-297 acres of nonriparian), and
34 implementing other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal
35 restoration [CM4], 693 acres of modeled habitat). ~~The other conservation measures~~ These
36 conservation measures (CM2 and CM4) account for 457 of the 521-530 acres (8886%) of impacts on
37 riparian habitat. Based on the DHCCP survey data of the Conveyance Planning Area (see Appendix
38 12C of the Draft EIR/EIS), an estimated seven-ten elderberry shrubs would be impacted in the near-
39 term by CM1 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate).

40 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
41 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3,
42 Conservation Strategy, of the Draft BDCP would be 1:1 for restoration and 1:1 for protection for
43 riparian habitat. Using these typical ratios would indicate that 64-73 acres of the riparian habitat
44 should be restored/created and 64-73 acres of existing riparian should be protected to mitigate the

1 CM1 losses of valley elderberry longhorn beetle habitat. The near-term effects of other conservation
2 actions would require 457 acres of riparian restoration and 457 acres of riparian protection using
3 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

4 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
5 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
6 timeframe as the construction and ~~early restoration losses~~ losses from other conservation measures,
7 thereby minimizing adverse effects on valley elderberry longhorn beetle. In addition, BDCP
8 Objectives VELB 1.1 and 1.2, which call for implementing the USFWS (1999) conservation guidelines
9 for valley elderberry longhorn beetle (transplanting elderberry shrubs and planting elderberry
10 seedlings and associated natives) and siting elderberry restoration within drainages immediately
11 adjacent to or in the vicinity of sites confirmed to be occupied by valley elderberry longhorn beetle.
12 These objectives would be met through the implementation of CM7 *Riparian Natural Community*
13 *Restoration*. CM7 *Riparian Natural Community Restoration* specifically calls for the planting of
14 elderberry shrubs in large, contiguous clusters with a mosaic of associated natives as part of
15 riparian restoration consistent with USFWS (1999) conservation guidelines. These Plan goals
16 represent performance standards for considering the effectiveness of restoration actions. The acres
17 of protection and restoration contained in the near-term Plan goals and the additional species
18 specific measures within CM7 satisfy the typical mitigation that would be applied to the project-level
19 effects of CM1, as well as mitigating the near-term effects of the other conservation 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*, and *AMM15 Valley Elderberry Longhorn Beetle*. AMM15 requires surveys for elderberry
25 shrubs within 100 feet of any ground disturbing activities, the implementation of avoidance and
26 minimize measures for any shrubs that are identified within this 100-foot buffer, and transplanting
27 shrubs that can't be avoided. All of these AMMs include elements that avoid or minimize the risk of
28 affecting habitats and species adjacent to work areas and RTM storage sites. The AMMs are
29 described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
30 [updated version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this](#)
31 [RDEIR/SDEIS/BDCP Appendix 3.C.](#)

32 **Late Long-Term Timeframe**

33 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat
34 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.
35 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 1,5611,578
36 acres of modeled valley elderberry longhorn beetle habitat (853-862 acres of riparian habitat and
37 708-716 acres of nonriparian habitat) during the ~~term of the Plan~~ BDCP permit term (5% of the
38 modeled habitat in the study area). The locations of these losses are described above in the analyses
39 of individual conservation measures. These losses would not fragment any known populations of
40 valley elderberry longhorn beetle. The Plan includes a commitment to protect 750 acres of riparian
41 habitat and restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to
42 Objective VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to
43 occupied habitat, which would provide connectivity between occupied and restored habitats and
44 improve the species' ability to disperse within and outside the Plan Area. Other factors relevant to
45 effects on valley elderberry longhorn beetle include:

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

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

24 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 4
25 would not be adverse because the BDCP has committed to restoring and protecting an acreage that
26 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and
27 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of
28 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status
29 species associated with Alternative 4 in the late long-term would represent an adverse effect.
30 However, with habitat protection and restoration associated with CM7, guided by species-specific
31 goals and objectives and by AMM1-AMM6, AMM10, and AMM15, which would be in place
32 throughout the construction period BDCP permit term, the effects of Alternative 4 as a whole on
33 valley elderberry longhorn beetle would not be adverse under NEPA.

34 **CEQA Conclusion:**

35 **Near-Term Timeframe**

36 Because the water conveyance facilities construction is being evaluated at the project level, the near-
37 term BDCP conservation strategy has been evaluated to determine whether it would provide
38 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
39 construction would be less than significant. Alternative 4 would result in permanent and temporary
40 impacts on 1,0461,063 acres of modeled habitat (521-530 acres of riparian and 525-533 acres of
41 nonriparian) for valley elderberry longhorn beetle in the study area in the near-term. These effects
42 would result from the construction of the water conveyance facilities (CM1, 64-73 acres of riparian
43 and 289-297 acres of nonriparian), and implementing other conservation measures (Yolo Bypass
44 fisheries improvements [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). Based on

1 the DHCCP survey data of the Conveyance Planning Area, an estimated ~~seven-ten~~ elderberry shrubs
2 would be impacted in the near-term (see Section 12.3.2.3 for a discussion on the methods used to
3 make this estimate).

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 valley elderberry longhorn
6 beetle in Chapter 3, *Conservation Strategy*, of the *Draft* BDCP would be 1:1 for restoration and 1:1 for
7 protection for riparian habitat. Using these typical ratios would indicate that ~~64-73~~ acres of the
8 riparian habitat should be restored/created and ~~64-73~~ acres of existing riparian should be protected
9 to mitigate the CM1 losses of valley elderberry longhorn beetle habitat. The near-term effects of
10 other conservation actions would require 457 acres of riparian restoration and 457 acres of riparian
11 protection using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

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

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 *AMM15 Valley Elderberry Longhorn Beetle*. AMM15 requires surveys for elderberry
28 shrubs within 100 feet of any ground disturbing activities, the implementation avoidance and
29 minimize measures for any shrubs that are identified within this 100-foot buffer, and transplanting
30 shrubs that can't be avoided. All of these AMMs include elements that avoid or minimize the risk of
31 affecting habitats and species adjacent to work areas and RTM storage sites. The AMMs are
32 described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
33 [updated version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this](#)
34 [RDEIR/SDEISBDCP Appendix 3.C.](#)

35 The natural community restoration and protection activities are expected to be concluded in the
36 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to
37 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
38 the AMMs, are more than sufficient to support the conclusion that the near-term impacts of
39 Alternative 4 would be less than significant under CEQA.

40 **Late Long-Term Timeframe**

41 Alternative 4 as a whole would result in the permanent loss of and temporary effects on ~~1,561~~**1,578**
42 acres of modeled valley elderberry longhorn beetle habitat (~~853-862~~ acres of riparian habitat and
43 ~~708-716~~ acres of nonriparian habitat) during the ~~term of the Plan~~**BDCP permit term** (5% of the
44 modeled habitat in the study area). The locations of these losses are described above in the analyses

1 of individual conservation measures. The Plan includes a commitment to protect 750 acres of
2 riparian habitat and restore or create 5,000 acres of riparian habitat in the Plan Area. According to
3 Objective VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to
4 occupied habitat, which would provide connectivity between occupied and restored habitats and
5 improve the species' ability to disperse within and outside the Plan Area. The BDCP also includes a
6 number of AMMs (AMM1–AMM6, AMM10, and AMM15) directed at minimizing or avoiding
7 potential impacts on valley elderberry longhorn beetle. The large acreages of conservation would
8 adequately compensate for the modeled habitats lost to construction and restoration activities.

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

15 Considering these protection and restoration provisions, which would provide acreages of new or
16 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
17 and restoration activities, implementation of Alternative 4 as a whole would not result in a
18 substantial adverse effect through habitat modifications and would not substantially reduce the
19 number or restrict the range of the species. Therefore, the alternative would have a less-than-
20 significant impact on valley elderberry longhorn beetle.

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

22 Construction activities associated with water conveyance facilities, conservation components and
23 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
24 conveyance facilities, including the transmission facilities, could result in ongoing periodic post-
25 construction disturbances with localized impacts on valley elderberry longhorn beetle over the term
26 of the BDCP. Construction related effects could result from ground-disturbing activities, stockpiling
27 of soils, and maintenance and refueling of heavy equipment could result in dust and the inadvertent
28 release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis (see Section
29 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that approximately
30 ~~45-34~~ shrubs could be indirectly affected by conveyance facilities construction (CM1). Restoration
31 activities could result in excavation or modification of channels, type conversion from riparian and
32 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other
33 protections from channel banks that occur within 100 feet of an elderberry shrubs. These potential
34 effects would be minimized or avoided through AMM1–AMM6, AMM10, and AMM15, which would
35 be in effect throughout the ~~Plan's construction phase~~ *BDCP permit term*.

36 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing
37 Alternative 4 conservation actions would not have an adverse effect on valley elderberry longhorn
38 beetle.

39 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust
40 and hazardous substances would accompany construction of the water conveyance facilities. An
41 estimated ~~45-34~~ shrubs could be indirectly affected by conveyance facilities construction (CM1). In
42 addition, ground-disturbing activities associated with the re-contouring of surface topography,
43 excavation or modification of channels, type conversion from riparian and grasslands to tidal
44 habitat, levee removal and modification, and removal of riprap and other protections from channel

1 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration
2 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 4
3 construction, operation, and maintenance, the BDCP would avoid the potential for substantial
4 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a
5 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.
6 Therefore, the indirect effects under this alternative would have a less-than-significant impact on
7 valley elderberry longhorn beetle.

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

10 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
11 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-4-14).

12 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled
13 valley elderberry longhorn beetle habitat (Table 12-4-14).

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

28 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with
29 implementing Alternative 4 could adversely affect valley elderberry longhorn beetle habitat
30 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry
31 establishment. Based on the information presented above, the current conditions in those areas that
32 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry
33 shrubs and, thus, CM2 would likely have minimal effects, if any, on the species. The modeled habitat
34 that would be periodically inundated from the implementation of CM5 could result in adverse effects
35 on valley elderberry longhorn beetle.

36 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a
37 result of implementing Alternative 4 conservation actions would not be adverse under NEPA when
38 taking into consideration CM7 habitat protection and restoration. This habitat protection and
39 restoration would be guided by species-specific goals and objectives, and by AMM1–AMM6, AMM10,
40 and AMM15, which would be in place throughout the time period that periodic effects would occur.

41 **CEQA Conclusion:** Alternative 4 (CM2 and CM5) would have periodic impacts on modeled valley
42 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)
43 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may

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

11 Considering these protection and restoration provisions and avoidance and minimization measures,
12 implementation of Alternative 4 as a whole would not result in a substantial adverse effect through
13 habitat modifications and would not substantially reduce the number or restrict the range of the
14 species. Therefore, periodic effects of inundation resulting from Alternative 4 would have a less-
15 than-significant impact on valley elderberry longhorn beetle.

16 **Nonlisted Vernal Pool Invertebrates**

17 This section describes the effects of Alternative 4, including water conveyance facilities construction
18 and implementation of other conservation components, on nonlisted vernal pool invertebrates that
19 are not covered by the Plan (Blennosperma vernal pool andrenid bee, hairy water flea, Ricksecker's
20 water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle). Little is known about
21 the range of these species so it is assumed that they have potential to occur in the same areas
22 described by the vernal pool crustacean modeled habitat. That habitat model consists of: vernal pool
23 complex, which consists of vernal pools and uplands that display characteristic vernal pool and
24 swale visual signatures that have not been significantly affected by agricultural or development
25 practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool complex, which consists of
26 low-value ephemeral habitat ranging from areas with vernal pool and swale visual signatures that
27 display clear evidence of significant disturbance due to plowing, disking, or leveling to areas with
28 clearly artificial basins such as shallow agricultural ditches, depressions in fallow fields, and areas of
29 compacted soils in pastures. For the purpose of the effects analysis, vernal pool complex is
30 categorized as high-value and degraded vernal pool complex is categorized as low-value for these
31 species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for vernal pool
32 crustaceans in the model. Also included as low-value for vernal pool habitat are areas along the
33 eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood seasonally
34 and support typical vernal pool plants, but do not include topographic depressions that are
35 characteristic of vernal pools.

36 Construction and restoration associated with Alternative 4 conservation measures would result in
37 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-4-15
38 and indirect conversions of vernal pool habitat. The majority of the losses would take place over an
39 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
40 Alternative 4 would also include the following conservation actions over the term of the BDCP that
41 would benefit nonlisted vernal pool invertebrates ([BDCP-see Chapter 3, Conservation Strategy, of the](#)
42 [Draft BDCP](#)).

- 43 • Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
44 recovery areas (ObjectiveVPNC1.1, associated with CM3).

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

10 As explained below, with the restoration or protection of these amounts of habitat, impacts on
11 nonlisted vernal pool invertebrates would not be adverse for NEPA purposes and would be less-than
12 significant for CEQA purposes.

13 **Table 12-4-15. Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with**
14 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1 ^g	High-value (vernal pool complex)	824	824	461	461	NA	NA
	Low-value (degraded vernal pool complex)	7	7	2	2	NA	NA
Total Impacts CM1		1531	1531	483	483	NA	NA
CM2-CM18 ^g	High-value (vernal pool complex)	0	0	0	0	0-4	0
	Low-value (degraded vernal pool complex)	201	372	0	0	0	0
Total Impacts CM2-CM18		201	372	0	0	0-4	0
TOTAL IMPACTS		216232	387403	183	183	0-4	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

15

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

3 Alternative 4 conservation measures would result in the direct, permanent loss of up to ~~387~~403
4 acres of vernal pool habitat from conveyance facilities construction (CM1) and the hypothetical
5 footprints for tidal natural communities restoration (CM4). In addition, the conservation measures
6 could result in the indirect conversion due to hydrologic alteration of an additional ~~145~~176 acres of
7 vernal pool habitat (~~98~~131 acres of high-value habitat and ~~47~~45 acres of low-value habitat) from
8 conveyance facilities construction (CM1) and based on the hypothetical footprints for tidal
9 restoration (CM4). Construction of the water conveyance facilities and restoration activities may
10 result in the modification of hardpan and changes to the perched water table, which could lead to
11 alterations in the rate, extent, and duration of inundation of nearby vernal pool habitat. USFWS
12 typically considers construction within 250 feet of vernal pools to constitute an indirect effect unless
13 more detailed information is provided to further refine the limits of any such effects. For the
14 purposes of this analysis, the 250-foot buffer was applied to the water conveyance facilities work
15 areas where surface and subsurface disturbance activities would take place and to restoration
16 hypothetical footprints. Habitat enhancement and management activities (CM11), which include
17 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

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

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

- 35 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
36 result in the permanent and temporary combined loss of approximately ~~33~~34 acres of vernal
37 pool habitat, composed of ~~24~~25 acres of high-value and 9 acres of low-value habitat (Table 12-
38 4-15). In addition, the conveyance facilities could result in the indirect conversion of ~~10~~41 acres
39 of vernal pool habitat in the vicinity of Clifton Court Forebay. The indirect effects would result
40 from the construction of ~~temporary-permanent~~ transmission ~~lines and from~~lines, from
41 the storage of reusable tunnel material, ~~and permanent access roads~~. *AMM30 Transmission Line*
42 *Design and Alignment Guidelines* would ensure that temporary transmission lines are designed
43 to avoid removal ~~wetted acres of aquatic habitats to the maximum extent practicable of wetted~~
44 ~~acres of vernal pools and alkali seasonal wetlands~~. There are no records of these nonlisted
45 vernal pool invertebrates at this location (California Department of Fish and Game 2012).

- 1 ● *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result
2 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which
3 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as
4 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual
5 signatures that display clear evidence of significant disturbance due to plowing, disking, or
6 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
7 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
8 other aquatic features in these areas is unknown but a 2012 review of Google Earth imagery of
9 these habitats found that they appear to generally have low densities. However, areas mapped
10 as degraded vernal pool complex may still provide habitat for vernal pool species as evidenced
11 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella
12 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Game
13 2012). So though degraded vernal pool complexes may not represent botanically diverse vernal
14 pools they still can provide habitat for vernal pool invertebrates and thus the loss of 372 acres of
15 degraded vernal pool complex may result in the loss of occupied vernal pool invertebrate
16 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of
17 vernal pool habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat. No
18 records of nonlisted vernal pool invertebrates would be directly impacted.
- 19 ● *CM11 Natural Communities Enhancement and Management:* As described in the BDCP,
20 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
21 vernal pool complex would benefit vernal pool invertebrates ~~(Table 12-4-15)~~. A variety of
22 habitat management actions included in CM11 that are designed to enhance wildlife values in
23 BDCP-protected habitats may result in localized ground disturbances that could temporarily
24 affect vernal pool invertebrate habitat. Ground-disturbing activities, such as removal of
25 nonnative vegetation and road and other infrastructure maintenance, are expected to have
26 minor effects on vernal pool invertebrate habitat and are expected to result in overall
27 improvements to and maintenance of vernal pool habitat values over the term of the BDCP.
28 These effects cannot be quantified, but are expected to be minimal and would be avoided and
29 minimized by the AMMs listed below.

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 impact conclusions are
32 also included. Table 12-4-16 was prepared to further analyze BDCP effects on nonlisted vernal pool
33 invertebrates using wetted acres of habitat in order to compare the effects of this alternative with
34 the effect limits established in ~~BDCP~~ Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the
35 Draft BDCP and AMM12, which are measured in wetted acres of habitat. Wetted acres were
36 estimated by using the BDCP's assumption that vernal pool complexes and degraded vernal pool
37 complexes would have a 15% density of vernal pools (i.e., of 100 acres of vernal pool complex 15
38 acres would constitute vernal pools and the remaining 85 acres supporting uplands). Based on an
39 informal evaluation of aerial photographs of the Plan Area it is likely that the actual densities within
40 the Plan Area are approximately 10%, but the 15% density value was chosen as a conservative
41 estimate for determining effects.

1 **Table 12-4-16. Estimated Effects on Wetted Nonlisted Vernal Pool Species Habitat under**
2 **Alternative 4 (acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 4	CM1 ^e	5.0 <u>5.1</u>	5.0 <u>5.1</u>	1.5 <u>6.2</u>	1.5 <u>6.2</u>
Impact ^b	CM4 ^c	30.2	55.8	11.0	20.3
Total		35.2 <u>35.3</u>	60.8 <u>60.9</u>	12.5 <u>17.2</u>	21.8 <u>26.5</u>

^a Because roughly half of the impacts would 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.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-4-15 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

~~^c The temporary impacts from transmission line construction associated with CM1 would be zero because the commitment in AMM30, which calls for temporary transmission lines to avoid removal of alkali seasonal wetland and vernal pool wetted acres. This would lower CM1 impacts to 2.3 acres.~~

^{cd} These impacts are based on the hypothetical restoration footprints and would 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.

3

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 or restoration in an appropriate timeframe to ensure that the effects of
8 construction would not be adverse under NEPA and would be less than significant under CEQA.
9 Table 12-4-15 above lists the impacts on nonlisted vernal pool invertebrate habitat that are based
10 on the natural community mapping done within the study area. The impacts from tidal natural
11 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual
12 impacts on vernal pool habitat considering the BDCP's commitment to design restoration projects to
13 minimize or avoid effects on vernal pools (see AMM12 and AMM30). As seen in Table 12-4-16, the
14 effects of CM1 alone would be well within the near-term limits. As seen in Table 12-4-16, Alternative
15 4 would not meet the Plan's near-term biological goals and objectives for direct and indirect effects
16 unless near-term projects are designed to ensure that they do not exceed these impact limits.

17 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
18 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
19 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that ~~5~~
20 ~~5.1~~ wetted acres of vernal pool (or ~~33-34~~ acres of vernal pool complex) should be restored and ~~13~~
21 ~~22.6~~ wetted acres (or ~~87-151~~ acres of vernal pool complex) protected to mitigate the CM1 direct and
22 indirect effects on nonlisted vernal pool species habitat. However, with the implementation of
23 AMM30 the effects on ~~aquatic habitat would be avoided to the maximum extent feasible during the~~
24 ~~designing of wetted acres of nonlisted vernal pool species habitat from CM1 would be reduced by~~
25 ~~approximately 2.7 acres (18 acres of modeled habitat) by redesigning the temporary the~~
26 transmission line west of Clifton Court Forebay. Assuming that the BDCP would apply the impact
27 limits presented in Table 12-4-13 and implement AMM30, direct impacts on wetted vernal pools

1 resulting from tidal restoration in the near-term ~~could not exceed 2.7 acres of direct effects on~~
2 ~~wetted vernal pool acreage would have to be avoided~~ and ~~indirect impacts could not exceed 9.53.8~~
3 wetted acres of indirect effects. The impacts based on the hypothetical tidal restoration footprints
4 would exceed these limits. When and if these limits are met, the BDCP would need to restore up to ~~5~~
5 ~~5.1~~ wetted acres (~~33-34~~ acres of vernal pool complex) and protect up to 30 wetted acres (200 acres
6 of vernal pool complex) in the near-term to offset the effects of CM1 and CM4.

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

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

19 The Plan's biological goals and objectives would also inform the near-term protection and
20 restoration efforts. These Plan goals represent performance standards for considering the
21 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
22 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool
23 invertebrate habitat.

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*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM30 Transmission*
29 *Line Design and Alignment Guidelines*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*,
30 though developed for vernal pool crustaceans, includes measures to avoid and minimize direct and
31 indirect effects on vernal pools and would thus be applicable to nonlisted vernal pool invertebrates
32 as well. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and
33 species adjacent to work areas. The AMMs are described in detail in [Appendix 3.C, Avoidance and](#)
34 [Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in](#)
35 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~BDCP Appendix 3.C.~~

36 **Late Long-Term Timeframe**

37 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
38 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
39 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-16, the effects of CM1 alone would
40 be ~~well within~~~~generally within the the~~ near-term limits, but overall Alternative 4 would not meet the
41 Plan's late long-term biological goals and objectives for direct and indirect effects unless tidal
42 restoration projects are designed to ensure that 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 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 4 would not be adverse
12 under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal
13 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation
14 ratios described above. In the absence of other conservation actions, the potential modification of
15 vernal pool habitat and potential mortality of special-status species resulting from Alternative 4 in
16 the late long-term would represent an adverse effect. However, the BDCP has committed to impact
17 limits for vernal pool habitat and to habitat protection, restoration, management and enhancement
18 associated with CM3, CM9, and CM11. This habitat protection, restoration, management, and
19 enhancement would be guided by species-specific goals and objectives, and by AMM1–AMM6,
20 AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the time ~~period of~~
21 ~~construction~~ BDCP permit term. Considering these commitments, losses and conversions of
22 nonlisted vernal pool invertebrates habitat under Alternative 4 would not be adverse.

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 impacts of construction would be less than significant under CEQA. Table 12-4-15 above lists the
29 impacts on vernal pool habitat that is based on the natural community mapping done within the
30 study area. The impacts from tidal natural communities restoration (CM4) are based on hypothetical
31 footprints and do not reflect actual impacts on vernal pool habitat considering the BDCP's
32 commitment to design restoration projects to minimize or avoid effects on vernal pools (see AMM12
33 and AMM30). As seen in Table 12-4-16, the effects of CM1 alone would be well-generally within the
34 near-term limits. As seen in Table 12-4-16, Alternative 4 would not meet the Plan's near-term
35 biological goals and objectives for direct and indirect effects unless near-term tidal restoration
36 projects are designed to ensure that they do not exceed these impact limits.

37 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
38 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
39 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that ~~5~~
40 ~~5.1~~ wetted acres of vernal pool (or ~~33-34~~ acres of vernal pool complex) should be restored and ~~13~~
41 22.6 wetted acres (or ~~87-151~~ acres of vernal pool complex) protected to mitigate the CM1 direct and
42 indirect effects on nonlisted vernal pool species habitat. However, with the implementation of
43 AMM30 the ~~aquatic habitat would be avoided to the maximum extent feasible during the designing~~

1 ~~of effects on wetted acres of nonlisted vernal pool habitat from CM1 would be reduced by~~
2 ~~approximately 2.7 acres (18 acres of modeled habitat) by redesigning the temporary~~ transmission
3 line west of Clifton Court Forebay. Assuming that the BDCP would apply the impact limits presented
4 in Table 12-4-13 and implement AMM30, impacts on wetted vernal pools resulting from tidal
5 restoration in the near-term ~~could not exceed 2.7 acres of direct effects on wetted vernal pool~~
6 ~~acreage would have to be avoided~~ and ~~indirect impacts could not exceed 9.5xx~~ wetted acres of
7 indirect effects. The impacts based on the hypothetical tidal restoration footprints would exceed
8 these limits. When and if these limits are met, the BDCP would need to restore up to ~~5-5.1~~
9 acres (~~33-34~~ acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal
10 pool complex) in the near-term to offset the effects of CM1 and CM4.

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

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

23 The species-specific biological goals and objectives would also inform the near-term protection and
24 restoration efforts. These Plan goals represent performance standards for considering the
25 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
26 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool
27 invertebrates.

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 *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM30 Transmission*
33 *Line Design*, and *Alignment Guidelines*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*,
34 though developed for vernal pool crustaceans, includes measures to avoid and minimize direct and
35 indirect effects on vernal pools and would thus be applicable to nonlisted vernal pool invertebrates
36 as well. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and
37 species adjacent to work areas. The AMMs are described in detail in Appendix 3.C, Avoidance and
38 Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in
39 Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS ~~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 4 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 12-4-16, the impacts of CM1 alone would be ~~well~~
5 ~~generally~~ within the near-term limits, but overall Alternative 4 would not meet the Plan's late long-
6 term biological goals and objectives for direct and indirect effects unless near-term 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 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 The effects on nonlisted vernal pool invertebrate habitat from Alternative 4 would represent an
19 adverse effect as a result of habitat modification of a special-status species and potential for direct
20 mortality in the absence of other conservation actions. 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. These conservation activities would be guided by goals and
23 objectives, and by AMM1-AMM6, AMM10, AMM12, AMM30, and AMM37, which would be in place
24 throughout the ~~time period any construction activity would be occurring~~ BDCP permit term.
25 Considering these commitments, Alternative 4 over the term of the BDCP would not result in a
26 substantial adverse effect through habitat modifications and would not substantially reduce the
27 number or restrict the range of nonlisted vernal pool invertebrates. Therefore, Alternative 4 would
28 have a less-than-significant 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~~ BDCP permit term.

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~~ BDCP permit term. Nonlisted vernal pool
42 invertebrates and their habitat could be periodically indirectly affected by maintenance activities at
43 water conveyance facilities. Embankment maintenance activities around Clifton Court Forebays

1 could result in the inadvertent discharge of sediments and hazardous materials into vernal pool
2 habitat that occurs along the southern and western boundaries of the forebays. These potential
3 effects would be avoided and minimized through AMM1–AMM6, which would be in effect
4 throughout the ~~term of the Plan~~BDCP permit term. The indirect effects of plan implementation
5 under Alternative 4 would not be adverse.

6 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
7 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and
8 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These
9 potential impacts would be minimized or avoided through AMM1–AMM6, and AMM10, which would
10 be in effect throughout BDCP permit term~~the Plan's construction phase~~. The indirect impacts of
11 Alternative 4 would be less than significant.

12 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates' Habitat** 13 **as a Result of Implementation of Conservation Components**

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

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

28 **CEQA Conclusion:** Alternative 4 would periodically inundate at most 4 acres of nonlisted vernal pool
29 invertebrates' habitat during the maximum flows over the Fremont Weir. The periodic inundation is
30 not anticipated to result in a conversion of nonlisted vernal pool invertebrates' habitat into different
31 wetland habitat. BDCP-associated inundation of areas that would not otherwise have been
32 inundated is expected to occur in no more than 30% of all years, because Fremont Weir is expected
33 to overtop the remaining 70% of all years, and during those years notch operations would not
34 typically affect the maximum extent of inundation. In more than half of all years under Existing
35 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.
36 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and
37 would thus result in less-than-significant impacts on the species.

38 **Sacramento and Antioch Dunes Anthicid Beetles**

39 This section describes the effects of Alternative 4, including water conveyance facilities construction
40 and implementation of other conservation components, on Sacramento and Antioch Dunes anthicid
41 beetles. Potential habitat in the study area includes the inland dune scrub at Antioch Dunes NWR,
42 sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge spoil piles (California
43 Department of Fish and Game 2006c and 2006d).

1 The construction, and operations and maintenance of the water conveyance facilities under
2 Alternative 4 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 construction would not
5 affect inland dune scrub habitat at Antioch Dunes NWR. No dredge spoil areas that could be
6 occupied by Sacramento anthicid beetle were identified within conveyance facilities footprints
7 during a review of Google Earth imagery. Also, a review of the locations of the Alternative 4 water
8 intake facilities on aerial imagery did not reveal any sandbars along the channel margins. These
9 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 4 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 4 would likely result in beneficial effects on Sacramento and
26 Antioch Dunes anthicid beetles. The following Alternative 4 objectives would generally increase
27 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 would improve shoreline conditions by creating benches along levees, shallow
33 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would
34 likely contribute to the formation of sandbars along Delta river channels where these measures
35 would be implemented. Increasing the structural diversity of Delta river channel margins and
36 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently
37 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetle
38 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-17. Changes in Sacramento and Antioch Dunes Anthicid Beetles’ Habitat Associated**
2 **with Alternative 4 (acres)^a**

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

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

UNK = unknown

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 4 conservation measures could affect Sacramento and Antioch Dunes
7 anthicid beetles and their habitat. As mentioned above, the extent of this habitat in the study area is
8 unknown but it is assumed that sand bars likely occur along to some degree along the Sacramento
9 and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge spoil piles. A
10 review of Google Earth imagery in the north Delta did identify three general areas that appear to
11 have accumulations of sandy soils (with some vegetation), possibly from dredge disposal, are
12 Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island. A
13 review of Google Earth imagery 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 habitat restoration
17 (CM4), floodplain restoration (CM5), and channel margin enhancement (CM6). 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 habitat for Sacramento and Antioch
20 Dunes anthicid beetles. Each of these individual activities is described below. A summary statement
21 of the combined impacts and NEPA and CEQA conclusions follows the individual conservation
22 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~~ see Chapter 3 ~~Conservation Strategy~~, Section 3.4.4, *Conservation*
6 *Measure 4, of the Draft BDCP*) as providing opportunities for creating subtidal aquatic and tidal
7 marsh habitats. The methods and techniques identified in ~~BDCP~~ Chapter 3, Section 3.4.4.3.3,
8 *Methods and Techniques, of the Draft BDCP* that may be used for tidal restoration include the
9 recontouring of lands so that they have elevations suitable for the establishment of marsh plains
10 and the eventual breaching of levees. There are three CNDDDB records of Sacramento anthicid
11 beetle (just north of Rio Vista, one just south of Rio Vista along the west shore of the Sacramento
12 River, and one on Grand Island) and one CNDDDB record of Antioch Dunes anthicid beetle (just
13 north of Rio Vista) that fall within the West Delta ROA (California Department of Fish and
14 Wildlife 2013). Tidal restoration actions in the West Delta ROA may eliminate potential habitat
15 and impact occupied habitat of both Sacramento and Antioch Dunes 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 Alternative 4 could result in substantial affects on Sacramento and Antioch Dunes anthicid beetles
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 chosen 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 4, 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. Other factors relevant to effects on Sacramento and Antioch Dunes anthicid
2 beetles are listed below.

- 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 beetles associated
16 with Alternative 4 as a whole would represent an adverse effect as a result of habitat modification of
17 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 4 as a whole on Sacramento and Antioch Dunes anthicid beetles would not be adverse
21 under NEPA.

22 **CEQA Conclusion:** Alternative 4 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 conservation measures CM5, CM6, and CM7, would generally
27 contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration (CM5) would
28 be phased over a period of 30 years so that not all sandbar habitat within these areas would be
29 affected at once. Furthermore, as floodplain restoration is being implemented new sandbar habitat
30 would likely be forming prior and/or concurrent with future floodplain restoration projects that
31 may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

32 Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration
33 (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the
34 Delta and be phased throughout the time period when the impacts would be occurring, the
35 implementation of Alternative 4 as a whole would not result in a substantial adverse effect though
36 habitat modification and would not substantially reduce the number or restrict the range of these
37 species. Therefore, the alternative would have a less-than-significant impact on Sacramento and
38 Antioch Dunes anthicid beetles.

39 **Delta Green Ground Beetle**

40 Suitable habitat in the study area would be vernal pool complexes and annual grasslands in the
41 general Jepson Prairie area. The construction, and operations and maintenance of the water
42 conveyance facilities under Alternative 4 would not affect delta green ground beetle because the
43 facilities and construction area are outside the known range of the species. Implementation of

Alternative 4 could affect delta green ground beetle through the protection of grasslands and vernal pool complex (CM3) in the vicinity of Jepson Prairie and the subsequent implementation of habitat enhancement and management actions and recreational trail construction (CM11) in these areas. In addition, tidal natural communities restoration (CM4) could result in potential impacts on delta green ground beetle and its habitat. Full implementation of Alternative 4 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 12-4-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	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

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

19

1 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**
2 **Beetle**

3 Alternative 4 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;
10 USFWS 2009). Further discussion of this potential effect is provided below, and NEPA and CEQA
11 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 (see ~~BDCP~~ Chapter 3, Section 3.4.4.3.3,
20 *Methods and Techniques, of the Draft BDCP*) includes excavating channels; modifying ditches,
21 cuts, and levees to encourage tidal circulation; and scalping higher elevation areas to create
22 marsh plains. These disturbances could affect delta green ground beetle through habitat
23 modification, either directly or indirectly through hydrologic modifications, and/or result in
24 direct mortality to the species. No CNDDDB records for delta green ground beetle are intersected
25 by the hypothetical tidal restoration footprints being used by the BDCP.
- 26 • *CM11 Natural Communities Enhancement and Management:* As described in *CM3 Natural*
27 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in
28 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres
29 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include
30 direct mortality to larvae and adults from the implementation of grassland management
31 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to
32 these grassland and vernal pool complex management actions, CM11 also includes guidelines
33 and techniques for invasive plant control, which may include manual control (hand-pulling and
34 digging), mechanical control (large equipment), and chemical control, though some of these
35 methods would be restricted in areas where rare plants occur or in critical habitat for vernal
36 pool species. The creation of new recreation trails as part of CM11 would result in impacts on
37 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

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

1 affected. Direct mortality and/or the affects to delta green ground beetle habitat would be an
2 adverse effect under NEPA. Implementation of mitigation measure BIO-42, *Avoid Impacts on Delta*
3 *Green Ground Beetle and its Habitat*, would reduce this effect.

4 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal
5 natural communities restoration (CM4), vernal pool restoration (CM9), and recreational trail
6 construction and subsequent enhancement and management actions (CM11) could impact delta
7 green ground beetle. Tidal restoration projects around Calhoun Cut and possible Lindsey Slough
8 could affect habitat and result in direct mortality to the species from excavating channels; modifying
9 ditches, cuts, and levees to encourage tidal circulation; and scalping higher elevation areas to create
10 marsh plains. Potential impacts from CM11 could include direct mortality to larvae and adults
11 resulting from the implementation of recreation trail construction in 15.5 acres of grassland in CZ 1
12 and from grassland management techniques, which may include livestock grazing, prescribed
13 burning, and mowing. AMM37 would ensure that new trails in vernal pool complexes be sited at
14 least 250 feet from wetland features, or closer if site-specific information indicates that local
15 watershed surrounding a vernal pools is not adversely affected. CM11 also includes guidelines and
16 techniques for invasive plant control, which may include manual control (hand-pulling and digging),
17 mechanical control (large equipment), and chemical control, though some of these methods would
18 be restricted in areas where rare plants occur and in critical habitat for vernal pool species. These
19 actions could result in adverse effects through habitat modification and a possible reduction in the
20 number of the species or restrict its range, and therefore result in significant impacts on delta green
21 ground beetle. Implementation of Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground*
22 *Beetle and its Habitat*, would reduce these potential impacts to a less-than-significant level.

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

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

- 29 • If recreational trail construction, habitat restoration or protection is planned for the lands
30 adjacent to Calhoun Cut and noncultivated lands on the western side of Lindsey Slough,
31 these area will be evaluated by a USFWS approved biologist for potential delta green ground
32 beetle habitat (large playa pools, or other similar aquatic features, with low growing
33 vegetation or bare soils around the perimeter). The biologist will have previous experience
34 with identifying suitable habitat requirements for delta green ground beetle.
- 35 • Any suitable habitat identified by the biologist (with previous experience with delta green
36 ground beetle) within the species current range will be considered potentially occupied and
37 all ground disturbing covered activities in these areas will be avoided, which for the Plan
38 Area is generally the area west of State Route 113.
- 39 • Any other areas identified as suitable habitat outside of the current range of the species will
40 be surveyed by a biologist with previous experience in surveying for and identifying delta
41 green ground beetle. No ground disturbing covered activities will occur in areas identified as
42 occupied by delta green ground beetle.
- 43 • Based on the results of the habitat evaluations and surveys, recreational trail construction
44 plans, and site-specific restoration and management plans will be developed so that they

1 don't conflict with the recovery goals for delta green ground beetle in the USFWS's 2005
2 *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S. Fish and
3 Wildlife Service 2005). Plans will include measures to protect and manage for delta green
4 ground beetle so that they continue to support existing populations or allow for future
5 colonization.

6 **Callippe Silverspot Butterfly**

7 This section describes the effects of Alternative 4 on callippe silverspot butterfly. Suitable habitats
8 are typically in areas influenced by coastal fog with hilltops that support the specie's host-plant,
9 Johnny jump-ups. Preferred nectar flowers used by adults include thistles, blessed milk thistle, and
10 coyote wild mint. Other native nectar sources include hairy false goldenaster, coast buckwheat,
11 mourning bride, and California buckeye. [Suitable habitat in the Plan Area is located in CZ11 in the
12 Cordellia Hills west of I-680 and in the Potrero Hills on the northern edge of Suisun Marsh.](#) The
13 construction, and operations and maintenance of the water conveyance facilities under Alternative 4
14 would not result in impacts on callippe silverspot butterfly or its habitat. If Cordelia Hills and
15 Potrero Hills are identified for grassland protection opportunities as part of *CM3 Natural
16 Communities Protection and Restoration* and the subsequent implementation of *CM11 Natural
17 Communities Enhancement and Management*, could affect callippe silverspot butterfly. Callippe
18 silverspot butterfly has been documented in the western most portion of the Plan Area (CZ 11) in
19 the Cordelia Hills (Solano County Water Agency 2009). Potential habitat for the species (grassy hills
20 with *Viola pedunculata*) is present in the Potrero Hills, but it has not been observed there (EDAW
21 2005, California Department of Fish and Wildlife 2013). Though CZ 11 has been identified as
22 potential area for grassland restoration in *CM8 Grassland Natural Community Restoration*, the
23 primary goal there is to restore small patches of grassland to connect to Jepson Prairie and/or the
24 restoration of upland grasses adjacent to tidal brackish emergent wetland in Suisun Marsh, both of
25 which would not be areas suitable for callippe silverspot butterfly. The full implementation of
26 Alternative 4 would protect up to 2,000 acres of grassland in CZ 11 (Objective GNC1.1, associated
27 with CM3), some of which may contain habitat for callippe silverspot butterfly. As explained below,
28 potential impacts on callippe silverspot would be adverse for NEPA purposes and would be
29 significant for CEQA purposes. Mitigation Measure BIO-43 would reduce the effects under NEPA and
30 reduce the impacts to a less-than-significant level under CEQA.

1 **Table 12-4-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	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

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

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

6 Alternative 4 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. If areas chosen for protection include Cordelia Hills or Potrero Hills,
15 where there is known and potential habitat, respectively, then grassland enhancement and
16 management actions could affect the callippe silverspot butterfly. Potential effects from CM11 could
17 include the loss of larval host and nectar sources and direct mortality to larvae and adults from the
18 installation of artificial nesting burrows and structures and the implementation of grassland
19 management techniques, which may include livestock grazing, prescribed burning, and mowing. In
20 addition to these grassland management actions, CM11 also includes guidelines and techniques for
21 invasive plant control, which may include manual control (hand-pulling and digging), mechanical
22 control (large equipment), and chemical control. Several of the preferred nectar sources are thistles,

1 some of which have been identified by the California Invasive Plant Council as having limited to
2 moderate ecological impacts (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. ~~However, the~~ management of these grasslands according to *CM11*
6 *Natural Communities Enhancement and Management* also has a potential to adversely affect this
7 species. Direct mortality and/or the removal of larval host plants and nectar sources for adults
8 would be an adverse effect under NEPA. Implementation of Mitigation Measure BIO-43, *Avoid and*
9 *Minimize Loss of Callippe Silverspot Butterfly Habitat*, would ensure the 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 a potential to
13 affect this species. Potential impacts from CM11 could include the loss of larval host and nectar
14 sources and direct mortality to 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, which
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 under CEQA. However, over the term of 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 thus 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.

1 **California Red-Legged Frog**

2 Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and
3 grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern
4 edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide
5 potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled
6 habitat, none is expected to be affected by BDCP actions.

7 Construction and restoration associated with Alternative 4 conservation measures would result in
8 both temporary and permanent losses of California red-legged frog modeled habitat as indicated in
9 Table 12-4-20. Factors considered in assessing the value of affected habitat for the California red-
10 legged frog, to the extent that information is available, are presence of limiting habitat (aquatic
11 breeding habitat), known occurrences and clusters of occurrences, proximity of the affected habitat
12 to existing protected lands, and the overall degraded or fragmented nature of the habitat. The study
13 area represents the extreme eastern edge of the species' coastal range, and species' occurrences are
14 reported only from CZ 8 and CZ 11. Full implementation of Alternative 4 would also include the
15 following biological objectives over the term of the BDCP to benefit the California red-legged frog
16 (~~BDCP~~see Chapter 3, *Conservation Strategy*, of the Draft BDCP).

- 17 • Increase native species diversity and relative cover of native plant species, and reduce the
18 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11,
19 CM13, and CM20).
- 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 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
25 CM11).
- 26 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
27 duration and suitable composition of vegetative cover to support breeding for covered
28 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

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

1
2

Table 12-4-20. Changes in California Red-Legged Frog Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	1	1	0	0	NA	NA
	Upland	636	636	3932	3932	NA	NA
Total Impacts CM1		737	737	3932	393 <u>2</u>	NA	NA
CM2–CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
Total Impacts CM2–CM18		08	24	0	0	0	0
TOTAL IMPACTS		1545	3161	3932	393 <u>2</u>	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

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

6 Alternative 4 conservation measures would result in the permanent and temporary loss combined
7 of up to 1 acre of modeled aquatic habitat and ~~69~~92 acres of modeled upland habitat for California
8 red-legged frog (Table 12-4-20). ~~There are eleven thirteen California red-legged frog occurrences~~
9 ~~that overlap with the Plan footprint in the area of temporary effects from CM11 in CZ 8 and CZ 11.~~
10 Conservation measures that would result in these losses are conveyance facilities and transmission
11 line construction (CM1) and recreational facility construction for CM11. Construction activities
12 associated with the water conveyance facilities and recreational facilities, including operation of
13 construction equipment, could result in temporary effects on, as well as injury and mortality of,
14 California red-legged frogs. In addition, natural enhancement and management activities (CM11),
15 which include ground disturbance or removal of nonnative vegetation, could result in local adverse
16 habitat effects. In addition, maintenance activities associated with the long-term operation of the
17 water conveyance facilities and other BDCP physical facilities could degrade or eliminate California
18 red-legged frog habitat including injury and mortality of California red-legged frogs. Each of these
19 individual activities is described below. A summary statement of the combined impacts and NEPA
20 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 21 ● CM1 Water Facilities and Operation: Construction of Alternative 4, including transmission line
22 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and ~~6~~36 acres

1 of upland habitat for California red-legged frog in CZ 8 (Table 12-4-20). Permanent effects
2 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension
3 and installation of cross culverts, installation of structural hardscape, and installation and
4 relocation of utilities. Construction-related effects would temporarily disturb 39-32 acres of
5 upland habitat for the California red-legged frog (Table 12-4-20). ~~Although~~ ~~there~~ ~~There~~
6 ~~are no Californiano California red-legged frog occurrences that overlap with the CM1~~
7 ~~construction footprint there are a number of occurrences .to the west of Clifton Court Forebay.~~

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

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

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

1 legged frogs if present in work sites. Implementation conservation actions and AMM1–AMM6,
2 AMM10, AMM14, and AMM37, would reduce these effects.

- 3 • Injury and direct mortality: Construction activities associated with the water conveyance
4 facilities, vernal pool complex restoration, and habitat and management enhancement-related
5 activities, including operation of construction equipment, could result in injury or mortality of
6 California red-legged frogs. Breeding, foraging, dispersal, and overwintering behavior may be
7 altered during construction activities, resulting in injury or mortality of California red-legged
8 frog. Frogs occupying burrows could be trapped and crushed during ground-disturbing
9 activities. Degradation and loss of estivation habitat is also anticipated to result from the
10 removal of vegetative cover and collapsing of burrows. Injury or mortality would be avoided and
11 minimized through implementation of seasonal constraints and preconstruction surveys in
12 suitable habitat, collapsing unoccupied burrows, and relocating frogs outside of the construction
13 area as described in AMM1–AMM6, AMM10, AMM14, and AMM37.

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

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 or restoration in an appropriate timeframe to ensure that the
21 effects of construction would not be adverse under NEPA

22 Alternative 4 would ~~would result in permanent and temporary effects combined on permanently~~
23 ~~remove~~ approximately 1 acre of aquatic habitat and ~~53-7676~~ acres of upland ~~terrestrial cover~~
24 habitat for California red-legged frog. The effects would result from construction of the water
25 conveyance facilities (CM1, ~~46-68~~ acres) and recreational facilities (CM11, 8 acres).

26 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
27 and that are identified in the biological goals and objectives for California red-legged frog in Chapter
28 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal
29 wetlands and 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre
30 of aquatic habitat should be restored, 1 acre of aquatic habitat should be protected, and ~~106-152~~
31 acres of grassland should be protected for California red-legged frog to mitigate the near-term
32 losses.

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

1 These conservation actions would occur in the same timeframe as the construction losses, thereby
2 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
3 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 California red-legged frog satisfy the typical
6 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
7 term effects of the other conservation measures.

8 The plan 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, AMM10 Restoration of Temporarily Affected Natural Communities, AMM14 California Red-*
13 *Legged Frog, and AMM37 Recreation.* These AMMs include elements that avoid or minimize the risk
14 of affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs are
15 described in detail in [BDCP Appendix 3.C, Avoidance and Minimization Measures Appendix 3.C,](#)
16 [Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is](#)
17 [provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS.](#)

18 **Late Long-Term Timeframe**

19 The habitat model indicates that the study area supports approximately 159 acres of aquatic [habitat](#)
20 [and](#) 7,766 acres of upland habitat for California red-legged frog. Alternative 4 as a whole would
21 result in the permanent loss of and temporary effects on 1 acre of aquatic habitat and ~~69-92~~ acres of
22 upland habitat for California red-legged frog for the term of the plan (less than 1% of the total
23 aquatic habitat in the study area and ~~less than~~[approximately](#) 1% of the total upland habitat in the
24 study area). The 1 acre of aquatic habitat that would be permanently lost is not known to be used for
25 breeding. Most of the California red-legged frog upland habitat that would be removed consists of
26 naturalized grassland or cultivated land in a highly disturbed or modified setting on lands
27 immediately adjacent to Clifton Court Forebay. The removed upland cover and dispersal habitat is
28 within 0.5 mile of a cluster of known California red-legged frog occurrences to the west. However,
29 this habitat consists mostly of cultivated lands and small patches of grasslands, and past and current
30 surveys in this area have not found any evidence that this habitat is being used ([see Appendix 12C,](#)
31 [2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report, of the Draft EIR/EIS](#)).

32 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area ([see](#)
33 [Table 3-4 in Chapter 3, Description of Alternatives, in this RDEIR/SDEIS](#)). Protection of at least 1,000
34 acres of grassland in CZ 8 west of Byron Highway would benefit the California red-legged frog by
35 providing habitat in the portion of the study area with the highest long-term conservation value for
36 the species based on known species occurrences and large, contiguous habitat areas (Objective
37 GNC1.1). Consistent with Objective GNC1.3, ponds and other aquatic features in the grasslands
38 would also be protected to provide aquatic habitat for this species, and the surrounding grassland
39 would provide dispersal and aestivation habitat. Aquatic features in the protected grasslands in CZ 8
40 would be maintained and enhanced to provide suitable inundation depth and duration and suitable
41 composition of vegetative cover to support breeding California red-legged frogs (Objective GNC2.5).
42 Additionally, livestock exclusion from streams and ponds and other measures would be
43 implemented as described in CM11 to promote growth of aquatic vegetation with appropriate cover
44 characteristics favorable to California red-legged frogs. Lands protected in CZ 8 would connect with
45 lands protected under the *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros

1 Watershed lands, including grassland areas supporting this species. This objective would ensure
2 that California red-legged frog upland and associated aquatic habitats would be protected and
3 enhanced in the largest possible patch sizes adjacent to occupied habitat within and adjacent to the
4 study area.

5 The BDCP's beneficial effects analysis (~~BDCP~~-see Chapter 5, Section 5.6, *Effects on Covered Wildlife*
6 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
7 above, as well as the restoration of tidal freshwater emergent wetland, grassland, valley/foothill
8 riparian, and vernal pool complex that could overlap with the species model, would result in the
9 restoration of 16 acres of aquatic and 351 acres of upland modeled habitat for California red-legged
10 frog. In addition, protection of managed wetland, grassland, valley/foothill riparian, and vernal pool
11 complex could overlap with the species model and would result in the protection of 3 acres of
12 aquatic and 1,047 acres of upland California red-legged frog modeled habitat.

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

22 **CEQA Conclusion:**

23 **Near-Term Timeframe**

24 Because the water conveyance facilities 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 impact of
27 conveyance facilities construction would be less than significant under CEQA.

28 Alternative 4 would ~~result in permanent and temporary effects combined on permanently remove~~
29 approximately 1 acre of aquatic habitat and ~~53-76~~ acres of upland terrestrial cover habitat for
30 California red-legged frog. The effects would result from construction of the water conveyance
31 facilities (CM1, ~~46-68~~ acres and CM11, 8 acres).

32 Typical CEQA project-level mitigation ratios of 1:1 for restored and 1:1 protected for nontidal
33 wetlands and a ratio of 2:1 for protected grassland habitats would indicate that 1 acre of aquatic
34 habitat should be protected, 1 acre of aquatic habitat should be protected, and ~~106-152~~ acres of
35 grassland should be protected in for California red-legged frog to mitigate the near-term losses.

36 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
37 (~~see~~ Table 3-4 in Chapter 3, *Description of Alternatives, in this RDEIR/SDEIS*). Protection of at least
38 1,000 acres of grassland in CZ 8, west of Byron Highway, will benefit California red-legged frog by
39 providing habitat in the portion of the Plan Area with the highest long-term conservation value for
40 the species based on known species occurrences and large, contiguous habitat areas (Objective
41 GNC1.1). Consistent with Objective GNC1.3, ponds and other aquatic features within the grasslands
42 will be protected to provide aquatic habitat for this species, and surrounding grassland will provide
43 dispersal and aestivation habitat which would compensate for the loss of 1 acre of aquatic habitat. In

1 addition, aquatic features in grasslands would be maintained and enhanced to provide suitable
2 inundation depth and duration to support breeding habitat for covered amphibians (Objective
3 GNC2.5, [BDCP in Chapter 3, Conservation Strategy, of the Draft BDCP](#)).

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

11 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM14, and AMM37.
12 These AMMs include elements that avoid or minimize the risk of affecting individuals and species
13 habitats adjacent to work areas and storage sites. The AMMs are described in detail in [Appendix 3.C,
14 Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM–6 is
15 provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix 3.C,
16 Avoidance and Minimization Measures.](#)

17 These commitments are more than sufficient to support the conclusion that the near-term effects of
18 Alternative 4 on California red-legged frog would be less than significant, because the number of
19 acres required to meet the typical ratios described above would be only 1 acre of aquatic habitat
20 restored, 1 acre of aquatic habitat protected, and 106 acres of upland communities protected.

21 **Late Long-Term Timeframe**

22 The habitat model indicates that the study area supports approximately 159 acres of aquatic [habitat](#)
23 [and](#) 7,766 acres of upland habitat for California red-legged frog. Alternative 4 as a whole would
24 result in the permanent loss of and temporary effects on 1 acre of aquatic habitat and ~~69-92~~ acres of
25 upland habitat for California red-legged frog for the term of the plan (less than 1% of the total
26 aquatic habitat in the study area and ~~less than~~ [approximately](#) 1% of the total habitat in the study
27 area). The 1 acre of aquatic habitat that would be permanently lost is not known to be used for
28 breeding. Most of the California red-legged frog upland habitat that would be removed consists of
29 naturalized grassland or cultivated land in a highly disturbed or modified setting on lands
30 immediately adjacent to Clifton Court Forebay. The removed upland cover and dispersal habitat is
31 within 0.5 mile of a cluster of known California red-legged frog occurrences to the west. However,
32 this habitat consists mostly of cultivated lands and small patches of grasslands, and past and current
33 surveys in this area have not found any evidence that this habitat is being used ([see Appendix 12C,
34 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report, of the Draft EIR/EIS](#)).

35 The BDCP has committed to long-term protection of up to 8,000 acres grassland in the Plan Area
36 ([see Table 3-4 in Chapter 3, Description of Alternatives, of this RDEIR/SDEIS](#)). Protection of at least
37 1,000 acres of grassland in CZ 8 west of Byron Highway would benefit the California red-legged frog
38 by providing habitat in the portion of the study area with the highest long-term conservation value
39 for the species based on known species occurrences and large, contiguous habitat areas (Objective
40 GNC1.1). Consistent with Objective GNC1.3, ponds and other aquatic features in the grasslands
41 would also be protected to provide aquatic habitat for this species, and the surrounding grassland
42 would provide dispersal and aestivation habitat. Aquatic features in the protected grasslands in CZ 8
43 would be maintained and enhanced to provide suitable inundation depth and duration and suitable
44 composition of vegetative cover to support breeding California red-legged frogs (Objective GNC2.5).

1 Additionally, livestock exclusion from streams and ponds and other measures would be
2 implemented as described in CM11 to promote growth of aquatic vegetation with appropriate cover
3 characteristics favorable to California red-legged frogs. Lands protected in CZ 8 would connect with
4 lands protected under the *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros
5 Watershed lands, including grassland areas supporting this species. This objective would ensure
6 that California red-legged frog upland and associated aquatic habitats would be protected and
7 enhanced in the largest possible patch sizes adjacent to occupied habitat within and adjacent to the
8 Plan Area.

9 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
10 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
11 above, as well as the restoration of tidal freshwater emergent wetland, grassland, valley/foothill
12 riparian, and vernal pool complex that could overlap with the species model, would result in the
13 restoration of 16 acres of aquatic and 351 acres of upland modeled habitat for California red-legged
14 frog. In addition, protection of managed wetland, grassland, valley/foothill riparian, and vernal pool
15 complex could overlap with the species model and would result in the protection of 3 acres of
16 aquatic and 1,047 acres of upland California red-legged frog modeled habitat.

17 In the absence of other conservation actions, the losses of California red-legged frog aquatic and
18 upland habitat associated with Alternative 4 would represent ~~an adverse effect~~ a significant impact
19 as a result of habitat modification and potential direct mortality of a special-status species. However,
20 with habitat protection and restoration associated with the conservation components, guided by
21 landscape-scale goals and objectives and AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of
22 Alternative 4 would have a less-than-significant impact on California red-legged frog.

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

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

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

37 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM14, and AMM37 as part of
38 implementing Alternative 4 would avoid the potential for adverse effects on California red-legged
39 frogs, either indirectly or through habitat modifications. These AMMs would also avoid and
40 minimize effects that could substantially reduce the number of California red-legged frogs, or
41 restrict the species' range. Therefore, the indirect effects of Alternative 4 would not have an adverse
42 effect on California red-legged frog.

1 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well
2 as construction-related noise and visual disturbances, could impact California red-legged frog in
3 aquatic and upland habitats. The use of mechanical equipment during construction could cause the
4 accidental release of petroleum or other contaminants that could impact California red-legged frog
5 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California red-
6 legged frog habitat could also have a negative impact on the species or its prey. With
7 implementation of AMM1–AMM6, AMM10, AMM14, and AMM37, Alternative 4 construction,
8 operation, and maintenance under Alternative 4 would avoid the potential for **substantial adverse**
9 **effects** **significant impacts** on California red-legged frog, either indirectly or through habitat
10 modifications, and would not result in a substantial reduction in numbers or a restriction in the
11 range of California red-legged frogs. The indirect effects of BDCP Alternative 4 would have a less-
12 than-significant impact on California red-legged frogs.

13 **California Tiger Salamander**

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

22 California tiger salamander occurs within the study area in CZ 8 west of Clifton Court Forebay and in
23 CZ 11 in the Potrero Hills (Figure 12-14). Potential habitat exists in vernal pool habitats in Yolo and
24 Solano Counties (CZs 1, 2, and 3) west of Liberty Island and in the vicinity of Stone Lakes and the
25 Cosumnes River Preserve in Sacramento County (CZ 4). DWR found California tiger salamander west
26 of Clifton Court Forebay in the same vicinity as several of the CNNDDB records (California
27 Department of Fish and Wildlife 2013) records (see Appendix 12C, 2009 to 2011 Bay Delta
28 Conservation Plan EIR/EIS Environmental Data Report, of the Draft EIR/EIS). There is also a small,
29 isolated population near Manteca, south of Highway 120 in CZ 7.

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

37 Alternative 4 is expected to result in the temporary, permanent, and periodic removal of upland
38 habitat that California tiger salamander uses for cover and dispersal (Table 12-4-21). Potential
39 aquatic habitat for this species would not be affected. While stock ponds are underrepresented as a
40 modeled habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative
41 4 would also include the following biological objectives over the term of the BDCP to benefit the
42 California tiger salamander (**BDCP see Chapter 3, Conservation Strategy, of the Draft BDCP**).

- 43 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
44 between existing conservation lands (Objective L1.6, associated with CM3).

- 1 ● Increase native species diversity and relative cover of native plant species, and reduce the
2 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 3 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
4 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
5 associated with CM3, CM8, and CM11).
- 6 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
7 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 8 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
9 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 10 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
11 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
12 ASWNC2.3, associated with CM11).
- 13 ● Protect 600 acres of existing vernal pool complex in in CZ 1, CZ 8, and/or CZ 11, primarily in
14 core vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of*
15 *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
16 associated with CM3).
- 17 ● Restore vernal pool complex in in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
18 acreage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated
19 impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of
20 vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).
- 21 ● Increase the size and connectivity of protected vernal pool complex within the Plan Area and
22 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective
23 VPNC1.3, associated with CM3).
- 24 ● Protect the range of inundation characteristics that are currently represented by vernal pools
25 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 26 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 27 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
28 GNC1.2, associated with CM3 and CM8).
- 29 ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
30 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
31 CM3).
- 32 ● Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
33 CM11).
- 34 ● Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
35 duration and suitable composition of vegetative cover to support breeding for covered
36 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

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

1 **Table 12-4-21. Changes in California Tiger Salamander Modeled Habitat Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	629	629	32	32	NA	NA
Total Impacts CM1		629	629	32	32	NA	NA
CM2–CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191–639	0
Total Impacts CM2–CM18		292	634	0	0	191–639	0
TOTAL IMPACTS		288321	640663	32	32	191–639	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

4 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**
5 **Salamander**

6 Alternative 4 conservation measures would result in the permanent and temporary loss combined
7 of up to ~~672-695~~ acres of modeled upland habitat for California tiger salamander (Table 12-4-21).
8 ~~There would be no effects on aquatic habitat. There is one California tiger salamander occurrence~~
9 ~~that overlaps with the CM1 footprint.~~ Conservation measures that would result in these losses are
10 conveyance facilities and transmission line construction, and establishment and use of RTM, borrow,
11 and spoils areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration
12 (CM4), construction of recreation facilities (CM11), and construction of a conservation fish hatchery
13 (CM18). Habitat enhancement and management activities (CM11), which include ground
14 disturbance or removal of nonnative vegetation, could 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 California tiger salamander
17 habitat. Each of these individual activities is described below. A summary statement of the combined
18 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities,
21 including transmission lines, would result in the permanent loss of ~~6-29~~ acres of upland habitat
22 for California tiger salamander habitat, primarily in CZ 8 (Table 12-4-21). Permanent effects
23 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension

1 and installation of cross culverts, installation of structural hardscape, and installation and
2 relocation of utilities. Construction-related effects would temporarily disturb 32 acres of upland
3 habitat for the California tiger salamander (Table 12-4-21). ~~In addition, there~~There is one
4 California tiger salamander occurrence just south of the City of Byron that overlaps with the
5 area of temporary effects. The area that would be affected by conveyance facilities construction
6 is south of Clifton Court Forebay, where modeled California tiger salamander habitat is of
7 relatively low value in that it consists of fragmented patches of primarily terrestrial habitat
8 surrounded by actively cultivated lands. The highest concentration of California tiger
9 salamander occurrences are in CZ 8 and west of the conveyance facilities alignment, while lands
10 to the east consist primarily of actively cultivated lands that are not suitable for the species.
11 Habitat loss in this area is not expected to contribute to habitat fragmentation or impede
12 important California tiger salamander dispersal.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
14 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the
15 California tiger salamander in the late long-term. The modeled habitat in the Yolo Bypass is of
16 low potential for California tiger salamander: There have been no observations of California
17 tiger salamander in this area based on the results of a number of surveys for vernal pool
18 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or
19 large grassland areas with stock ponds and similar aquatic features that hold water long enough
20 to provide potential breeding habitat for this species.
- 21 ● *CM4 Tidal Natural Communities Restoration*: This activity would result in the permanent
22 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area
23 in the late long-term. Tidal restoration in the Cache Slough area would result in habitat loss
24 along the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the
25 eastern edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the
26 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool
27 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson
28 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and
29 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species. However, the
30 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded
31 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the
32 northeastern edge of the Jepson Prairie block of habitat and would not contribute to
33 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based
34 on projections of where restoration may occur, actual effects are expected to be lower because
35 of the ability to select sites that minimize effects on California tiger salamander.
- 36 ● *CM11 Natural Communities Enhancement and Management*: Based on the recreation
37 assumptions described in ~~BDCP~~Chapter 4, *Covered Activities and Associated Federal Actions*, ~~of~~
38 ~~the Draft BDCP~~, an estimated 40 acres of terrestrial cover and aestivation habitat for the
39 California tiger salamander would be removed as a result of constructing trails and associated
40 recreational facilities ~~in CZ 8~~. Passive recreation in the reserve system could result in trampling
41 and disturbance of eggs and larvae in water bodies, degradation of water quality through
42 erosion and sedimentation, and trampling of sites adjacent to upland habitat used for cover and
43 movement. However, *AMM37 Recreation* requires protection of water bodies from recreational
44 activities and requires trail setbacks from wetlands. With these restrictions, recreation related
45 effects on California tiger salamander are expected to be minimal.

1 Habitat enhancement- and management-related activities in protected California tiger
2 salamander habitats would result in overall improvements to and maintenance of California
3 tiger salamander habitat values over the term of the BDCP. Activities associated with natural
4 communities enhancement and management over the term of the BDCP in protected California
5 tiger salamander habitat, such as ground disturbance or herbicide use to control nonnative
6 vegetation, could result in local adverse habitat effects and injury or mortality of California tiger
7 salamander and disturbance effects if individuals are present in work sites. Implementation of
8 AMM1–AMM6, AMM10, AMM13, and AMM37 would reduce these effects. Herbicides would only
9 be used in California tiger salamander habitat in accordance with the written recommendation
10 of a licensed, registered Pest Control Advisor and in conformance with label precautions and
11 federal, state, and local regulations in a manner that avoids or minimizes harm to the California
12 tiger salamander.

- 13 ● *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of
14 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger
15 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have
16 not been developed, although the facility is expected to be constructed near Rio Vista on
17 cultivated lands in low-value habitat for the species.
- 18 ● *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie
19 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located
20 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat
21 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with
22 some restoration taking place along the Barker and Lindsey Slough channels west to
23 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough
24 Channel west of SR 113 into Critical Habitat Unit 2.
- 25 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
26 little if any adverse effect on the California tiger salamander. Postconstruction operation and
27 maintenance of the above-ground water conveyance facilities could result in ongoing but
28 periodic disturbances that could affect California tiger salamander use of the surrounding
29 habitat. Operation of maintenance equipment, including vehicle use along transmission
30 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if
31 present in work sites. These effects, however, would be minimized with implementation of the
32 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and
33 AMM37.
- 34 ● *Injury and direct mortality*: Construction activities associated with the water conveyance
35 facilities, vernal pool complex restoration, and habitat and management enhancement-related
36 activities, including operation of construction equipment, could result in injury or mortality of
37 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered
38 during construction activities, resulting in injury or mortality of California tiger salamander if
39 the species is present. Salamanders occupying burrows could be trapped and crushed during
40 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to
41 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would
42 be avoided and minimized through implementation of seasonal constraints and preconstruction
43 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside
44 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
3 also 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 or restoration in an appropriate timeframe to ensure that the effects of
8 construction would not be adverse under NEPA.

9 Alternative 4 would permanently ~~remove and temporarily affect and temporarily combined remove~~
10 approximately ~~330-353~~ acres of upland terrestrial cover habitat for California tiger salamander.
11 There would be no effects on aquatic habitat. The effects would result from construction of the
12 water conveyance facilities (CM1, ~~38-61~~ acres), Yolo Bypass improvements (CM2, 42 acres), tidal
13 habitat restoration (CM4, 203 acres), construction of recreational facilities (CM11, 12 acres), and
14 construction of conservation hatcheries (CM18, 35 acres).

15 Typical NEPA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate
16 that ~~636-706~~ acres of grassland should be protected in the near-term for California tiger salamander
17 to mitigate the near-term losses.

18 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
19 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic
20 ~~habitat~~(~~habitat~~ (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat
21 (Objective GNC1.1). The landscape-scale goals and objectives would inform the near-term protection
22 and restoration efforts. The natural community restoration and protection activities are expected to
23 be concluded during the first 10 years of plan implementation, which is close enough in time to the
24 occurrence of impacts to constitute adequate mitigation for NEPA purposes.

25 In addition, the plan contains 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, AMM10 Restoration of Temporarily Affected Natural Communities, AMM13 California Tiger*
30 *Salamander, and AMM37 Recreation. These AMMs include elements that avoid or minimize the risk*
31 *of affecting habitats and species adjacent to work areas and storage sites. The AMMs are described*
32 *in detail in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated*
33 *version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS.*~~BDCP~~
34 *Appendix 3.C, Avoidance and Minimization Measures.*

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 modeled habitat for California tiger salamander. Alternative 4 as a whole
38 would result in the permanent loss of, and temporary effects on, ~~672-695~~ acres of upland habitat for
39 California tiger salamander for the term of the plan (~~less than~~approximately 2% of the total upland
40 habitat in the study area). The location of these losses is described above in the discussions of CM2,
41 CM4, CM11, and CM18.

1 The BDCP has committed to long-term protection of 8,000 acres of grassland in the Plan Area ([see](#)
2 Table 3-4 in Chapter 3, [Description of Alternatives, in this RDEIR/SDEIS](#)). Protection of at least 1,000
3 acres of grassland in CZ 8 west of Byron Highway would benefit the California tiger salamander by
4 providing habitat in the portion of the study area with the highest long-term conservation value for
5 the species based on known species occurrences and large, contiguous habitat areas (Objective
6 GNC1.1). Consistent with Objective GNC1.3, ponds and other aquatic features in the grasslands
7 would also be protected to provide aquatic habitat for this species, and the surrounding grassland
8 would provide dispersal and aestivation habitat. Aquatic features in the protected grasslands in CZ 8
9 would be maintained and enhanced to provide suitable inundation depth and duration and suitable
10 composition of vegetative cover to support breeding California tiger salamanders (Objective
11 GNC2.5). Additionally, livestock exclusion from streams and ponds and other measures would be
12 implemented as described in CM11 to promote growth of aquatic vegetation with appropriate cover
13 characteristics favorable to California tiger salamanders. Lands protected in CZ 8 would connect
14 with lands protected under the *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros
15 Watershed lands, including grassland areas supporting this species. This objective would ensure
16 that California tiger salamander upland and associated aquatic habitats would be protected and
17 enhanced in the largest possible patch sizes adjacent to occupied habitat within and adjacent to the
18 study area.

19 The BDCP's beneficial effects analysis ([BDCP-see](#) Chapter 5, Section 5.6, [Effects on Covered Wildlife](#)
20 [and Plant Species, of the Draft BDCP](#)) estimates that the restoration and protection actions discussed
21 above, as well as the restoration of alkali seasonal wetland complex, vernal pool complex, and
22 grassland that could overlap with the species model, would result in the restoration of 88 acres of
23 aquatic and 598 acres of upland modeled habitat for California tiger salamander. In addition,
24 protection of alkali seasonal wetland complex, vernal pool complex, and grassland that could
25 overlap with the species model, would result in the protection of 750 acres of aquatic and 5,000
26 acres of upland California tiger salamander modeled habitat.

27 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 4
28 would be not be adverse because the BDCP has committed to protecting the acreage required to
29 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger
30 salamander upland habitat associated with Alternative 4, in the absence of other conservation
31 actions, would represent an adverse effect as a result of habitat modification and potential direct
32 mortality of a special-status species. However, with habitat protection and restoration associated
33 with the conservation components, guided by landscape-scale goals and objectives and by AMM1-
34 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 4 as a whole on California tiger
35 salamander would not be adverse.

36 **CEQA Conclusion:**

37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction is being evaluated at the project level, the near-
39 term BDCP conservation strategy has been evaluated to determine whether it would provide
40 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
41 construction impacts would be less than significant under CEQA.

42 Alternative 4 would permanently [and temporarily combined](#) remove approximately [318-353](#) acres
43 of upland terrestrial cover habitat for California tiger salamander. There would be no effects on
44 aquatic habitat. The effects would result from construction of the water conveyance facilities (CM1,

1 ~~38-61~~ acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203 acres)
2 construction of conservation hatcheries (CM18, 35 acres), and construction of recreational facilities
3 (CM11, 12 acres).

4 Typical CEQA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate
5 that ~~636-706~~ acres of grassland should be protected in the near-term for California tiger salamander
6 to mitigate the near-term losses.

7 The BDCP has committed to near-term restoration of 1,140 acres of upland habitat (Objective
8 GNC1.2) and 40 acres of aquatic habitat and to protection of 520 acres of aquatic ~~habitat~~(~~habitat~~
9 (~~Objective ASWNC1.1 and Objective VPNC1.1~~) and 2,000 acres of upland habitat (Objective GNC1.1).
10 The landscape-scale goals and objectives would inform the near-term protection and restoration
11 efforts. The natural community restoration and protection activities are expected to be concluded
12 during the first 10 years of plan implementation, which is close enough in time to the occurrence of
13 impacts to constitute adequate mitigation for CEQA purposes.

14 In addition, the plan contains commitments to implement AMM1–6, AMM10, AMM13, and AMM37,
15 which include elements that avoid or minimize the risk of affecting habitats and species adjacent to
16 work areas and storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and](#)
17 [Minimization Measures, of the Draft BDCP, and an updated version of AMM–6 is provided in](#)
18 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~BDCP-Appendix 3.C, Avoidance and~~
19 ~~Minimization Measures~~. These commitments are more than sufficient to support the conclusion that
20 the near-term impacts of Alternative 4 on California tiger salamander would be less than significant,
21 because the number of acres required to meet the typical ratios described above would be only 636
22 acres of upland communities protected.

23 **Late Long-Term Timeframe**

24 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
25 29,459 acres of upland habitat for California tiger salamander. Alternative 4 as a whole would result
26 in the permanent loss of, and temporary effects on, ~~672-695~~ acres of upland habitat for California
27 tiger salamander for the term of the plan (~~less than~~[approximately](#) 2% of the total upland habitat in
28 the study area). The location of these losses is described above in the discussions of CM1, CM2, CM4,
29 and CM18.

30 Implementation of BDCP conservation components would result in protection of at least 8,000 acres
31 of grasslands, 600 acres of vernal pool complex and 150 acres of alkali seasonal wetland complex in
32 CZ 1, CZ 8, and CZ 11, and restoration of 2,000 acres of grasslands and 67 acres of vernal pool
33 complex, all of which would benefit California tiger salamander. The protection and restoration
34 would provide habitat in the portions of the study area with the highest long-term conservation
35 value for the species based on known species occurrences and large, contiguous habitat areas. Ponds
36 and other aquatic features in the grasslands would be protected to provide aquatic habitat for this
37 species, and surrounding grassland would provide dispersal and aestivation habitat. Protected
38 grassland and vernal pool complex in CZ 8 would connect with the East Contra Costa County
39 HCP/NCCP reserve system, including grassland areas supporting this species. Protected lands in CZ
40 11 would connect with the future Solano County reserve system, including grassland and vernal
41 pool complex areas supporting this species. The larger habitat area and improved connectivity
42 would increase opportunities for genetic exchange and allow for colonization of restored habitats in
43 areas where the species has been extirpated. Protecting seasonal ponds associated with grasslands
44 would ensure that California tiger salamander aquatic habitat and associated uplands would be

1 preserved and enhanced in the largest possible patch sizes adjacent to occupied habitat within and
2 adjacent to the study area. Grassland restoration would focus specifically on connecting fragmented
3 patches of protected grasslands, thereby increasing dispersal opportunities for the California tiger
4 salamander. Grasslands would be enhanced to increase burrow availability to provide refugia and
5 cover for aestivating and dispersing California tiger salamanders.

6 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
7 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
8 above, as well as the restoration of alkali seasonal wetland complex, vernal pool complex, and
9 grassland that could overlap with the species model, would result in the restoration of 88 acres of
10 aquatic and 598 acres of upland modeled habitat for California tiger salamander. In addition,
11 protection of alkali seasonal wetland complex, vernal pool complex, and grassland that could
12 overlap with the species model, would result in the protection of 750 acres of aquatic and 5,000
13 acres of upland California tiger salamander modeled habitat. In the absence of other conservation
14 actions, the losses of California tiger salamander upland habitat associated with Alternative 4 would
15 represent ~~an adverse effect~~ **a significant impact** as a result of habitat modification and potential
16 direct mortality of a special-status species. However, with habitat protection and restoration
17 associated with the conservation components, guided by landscape-scale goals and objectives and
18 by AMM1-AMM6, AMM10, AMM13, and AMM37, which would be in place throughout the
19 construction phase, the impacts of Alternative 4 as a whole on California tiger salamander would not
20 be significant.

21 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

22 Indirect effects could occur outside of the construction footprint but within 500 feet of California
23 tiger salamander habitat. Activities associated with conservation component construction and
24 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
25 conveyance facilities, including the transmission facilities, could result in ongoing but periodic
26 postconstruction disturbances with localized effects on California tiger salamander and its habitat,
27 and temporary noise and visual disturbances over the term of the BDCP. Most of the areas indirectly
28 affected are associated with the construction of Byron Forebay and its borrow and spoil areas in CZ
29 8.

30 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
31 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
32 of California tiger salamander habitat downstream of the construction area by filling in pools and
33 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the
34 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants
35 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
36 quality and California tiger salamander.

37 **NEPA Effects:** Implementation of AMM1-AMM6, AMM10, AMM13, and AMM37 under Alternative 4
38 would avoid or minimize the potential for adverse effects on California tiger salamanders, either
39 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
40 could substantially reduce the number of California tiger salamanders or restrict the species' range.
41 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on California tiger
42 salamander.

43 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance
44 as well as construction-related noise and visual disturbances could impact California tiger

1 salamander in aquatic and upland habitats. The use of mechanical equipment during construction
2 could cause the accidental release of petroleum or other contaminants that could impact California
3 tiger salamander or its prey. The inadvertent discharge of sediment or excessive dust adjacent to
4 California tiger salamander habitat could also have a negative impact on the species or its prey. With
5 implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 as part of Alternative 4, the BDCP
6 would avoid the potential for ~~substantial adverse effects~~significant impacts on California tiger
7 salamander, either indirectly or through habitat modifications, and would not result in a substantial
8 reduction in numbers or a restriction in the range of California tiger salamanders. The indirect
9 effects of Alternative 4 would have a less-than-significant impact on California tiger salamander.

10 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a** 11 **Result of Implementation of Conservation Components**

12 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in
13 periodic inundation of California tiger salamander habitat. Periodic inundation of Yolo Bypass could
14 affect from an estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an
15 estimated 639 acres of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-4-21).
16 This effect would only occur during an estimated maximum of 30% of years and in areas that are
17 already inundated in more than half of all years; therefore, these areas are expected to provide only
18 marginal terrestrial habitat for the California tiger salamander under Existing Conditions. No aquatic
19 breeding habitat would be affected (Table 12-4-21): the modeled habitat in the Yolo Bypass, in the
20 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records
21 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland
22 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this
23 species. Therefore, the terrestrial habitat that would be affected has a small likelihood of supporting
24 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on
25 the species, if any.

26 **NEPA Effects:** The effects of periodic inundation from Alternative 4 would not have an adverse effect
27 on California tiger salamander.

28 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically
29 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for
30 California tiger salamander. Because this area is considered low-value habitat and there are no
31 California tiger salamander records in the area, and because of the lack of suitable breeding habitat
32 in this area, the effects of periodic inundation of California tiger salamander habitat from Alternative
33 4 would have a less-than-significant impact.

34 **Giant Garter Snake**

35 The habitat model used to assess effects for the giant garter snake is based on aquatic habitat and
36 upland habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun
37 Marsh), tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and
38 nontidal perennial aquatic natural communities; rice fields; and artificial canals and ditches.
39 Modeled upland habitat is composed of all nonwetland and nonaquatic natural communities
40 (primarily grassland and cropland) within 200 feet of modeled aquatic habitat features. The
41 modeled upland habitat is ranked as high-, moderate-, or low-value based on giant garter snake
42 associations between vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical
43 and recent occurrence records ([see Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS](#))

1 *Environmental Data Report, of the Draft EIR/EIS*), and presence of features necessary to fulfill the
2 species' life cycle requirements. Modeled habitat is expressed in acres for aquatic and upland
3 habitats, and in miles for linear movement corridors in aquatic habitat. Other factors considered in
4 assessing the value of affected habitat for the giant garter snake, to the extent that information is
5 available, are proximity to conserved lands and recorded occurrences of the species, proximity to
6 giant garter snake subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in
7 the study area that are identified in the draft recovery plan for this species (U.S. Fish and Wildlife
8 Service 1999b), and contribution to connectivity between giant garter snake subpopulations.

9 Construction and restoration associated with Alternative 4 conservation measures would result in
10 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table
11 12-4-22. The majority of the losses would take place over an extended period of time as tidal marsh
12 is restored in the study area. Full implementation of Alternative 4 would also include the following
13 biological objectives over the term of the BDCP to benefit the giant garter snake (*BDCP-see* Chapter
14 3, *Conservation Strategy, of the Draft BDCP*).

- 15 • Increase native species diversity and relative cover of native plant species, and reduce the
16 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 17 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
18 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
19 TFEWNC1.1, associated with CM3 and 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, with suitable habitat
22 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
23 associated with CM3 and CM10).
- 24 • Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other
25 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 26 • Target cultivated land conservation to provide connectivity between other conservation lands
27 (Objective CLNC1.2, associated with CM3).
- 28 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
29 lands that occur in cultivated lands within the reserve system, including isolated valley oak
30 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
31 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
32 with CM3 and CM11).
- 33 • Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create
34 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500
35 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective
36 GGS1.1, associated with CM3, CM4, and CM10).
- 37 • Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored
38 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake
39 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or
40 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 41 • Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands
42 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot
43 buffers between protected giant garter snake habitat and roads (other than those roads

- 1 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake
2 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective
3 GGS1.3, associated with CM3).
- 4 • Create connections from the White Slough population to other areas in the giant garter snake's
5 historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least
6 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter
7 snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater
8 emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater
9 emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to
10 500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored
11 aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
 - 12 • Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create
13 600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2
14 (Objective GGS2.1, associated with CM3 and CM10).
 - 15 • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored
16 under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the
17 600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,
18 associated with CM3 and CM8).
 - 19 • To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,
20 protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder
21 consisting of compatible cultivated land that can support giant garter snakes. The cultivated
22 lands may be a subset of lands protected for the cultivated lands natural community and other
23 covered species (Objective GGS2.3, associated with CM3).
 - 24 • Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or
25 protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by
26 establishing 200-foot buffers between protected giant garter snake habitat and roads, and
27 establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for
28 urban development (Objective GGS2.4, associated with CM3).
 - 29 • Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,
30 perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may
31 consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of
32 tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets
33 giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields
34 in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*
35 *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value
36 habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable
37 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with
38 CM3, CM4, and CM10).
- 39 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
40 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes
41 and would be less than significant for CEQA purposes.

1 **Table 12-4-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 4^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Aquatic (acres)	83217	83217	681 20	68120	NA	NA
	Upland (acres)	41145 5	41145 5	188 193	18819 3	NA	NA
	Aquatic (miles)	13	13	67	67	NA	NA
Total Impacts CM1 (acres)		49467 2	49467 2	256 313	2563 13	NA	NA
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
Total Impacts CM2–CM18 (acres)		1,646	2,941	234	299	582–1,402	606
TOTAL IMPACTS CM1–CM18 (acres)		2,140 2,318	3,435 3,613	490 547	5556 12	582–1,402	606

^a See Appendix 12E, Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS, for a 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 Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

^d 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.

^e 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

2

3 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

4 Alternative 4 conservation measures would result in the permanent and temporary loss combined
5 of up to ~~687-873~~ acres of modeled aquatic habitat (tidal and nontidal combined), up to ~~3,3033,352~~
6 acres of modeled upland habitat, and up to ~~218-219~~ miles of channels providing aquatic movement
7 habitat for the giant garter snake (Table 12-4-22). ~~There are three giant garter snake occurrences~~
8 ~~that overlap with the Plan footprint (insert Figure XX)~~. Conservation measures that would result in
9 these losses are conveyance facilities and transmission line construction, geotechnical investigation,
10 and establishment and use of RTM, borrow, and spoils areas (CM1), Fremont Weir/Yolo Bypass
11 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), and
12 construction of a conservation fish hatchery (CM18). Habitat enhancement and management
13 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
14 result in local adverse habitat effects. Ground-disturbing activities, such as removal of nonnative
15 vegetation and road and other infrastructure maintenance, are expected to have minor effects on
16 available giant garter snake habitat and are expected to result in overall improvements to and

1 [maintenance of giant garter snake habitat values](#). In addition, maintenance activities associated with
2 the long-term operation of the water conveyance facilities and other BDCP physical facilities could
3 degrade or eliminate giant garter snake habitat. Each of these individual activities is described
4 below. Each of these individual activities is described below. A summary statement of the combined
5 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
6 discussions.

- 7 • **CM1 Water Facilities and Operation:** Construction of Alternative 4 conveyance facilities would
8 result in the permanent loss of approximately [494-672](#) acres of modeled giant garter snake
9 habitat, composed of [83-217](#) acres of aquatic habitat and [411-455](#) acres of upland habitat (Table
10 12-4-22). The [411-455](#) acres of upland habitat that would be removed for the construction of the
11 conveyance facilities consists of [172-130](#) acres of high-, [221-292](#) acres of moderate-, and [18-33](#)
12 acres of low-value habitat. In addition, approximately 13 miles of channels providing giant
13 garter snake movement habitat would be removed as a result of conveyance facilities
14 construction. Development of the water conveyance facilities would also result in the temporary
15 removal of up to [68-120](#) acres of giant garter snake aquatic habitat and up to [188-193](#) acres of
16 adjacent upland habitat in areas near construction [and geotechnical investigation](#) in CZ 5 and CZ
17 6 (see Table 12-4-22 and [the Terrestrial Biology Map Book in Appendix A of this](#)
18 [RDEIR/SDEIS](#)). In addition, approximately [6-7](#) miles of channels providing giant garter snake
19 movement habitat would be temporarily removed as a result of conveyance facilities
20 construction. [There are three giant garter snake occurrences in the vicinity of the CM1](#)
21 [construction footprint in Snodgrass Slough and Middle River](#).

22 Most of the habitat to be lost is in CZ 6 on Mandeville Island. Refer to the Terrestrial Biology Map
23 [Book in Appendix A of this RDEIR/SDEIS](#) for a detailed view of Alternative 4 construction
24 locations. Water facilities construction and operation is expected to have low to moderate
25 potential for adverse effects on giant garter snake aquatic habitat on Mandeville Island because
26 it is not located near or between populations identified in the draft recovery plan. An estimated
27 [222-301](#) of the [496-672](#) acres would be lost as storage areas for reusable tunnel material, which
28 would likely be moved to other sites for use in levee build-up and restoration, and the affected
29 area would likely be restored: while this effect is categorized as permanent because there is no
30 assurance that the material would eventually be moved, the effect would likely be temporary.
31 Furthermore, the amount of storage area needed for reusable tunnel material is flexible and the
32 footprint used in the effects analysis is based on a worst case scenario: the actual area to be
33 affected by reusable tunnel material storage would likely be less than the estimated acreage.

- 34 • **CM2 Yolo Bypass Fisheries Enhancement:** Construction activity associated with fisheries
35 improvements in the Yolo Bypass would result in the permanent and temporary removal of
36 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter
37 snake in the late long-term. The upland habitat that would be removed is composed of 336 acres
38 of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat. Approximately 14
39 miles (less than 1% of total miles in Plan Area) of channels providing giant garter snake habitat
40 for movements would be removed as a result of Fremont Weir/Yolo Bypass Improvements.
41 Most of this habitat removal would occur at the north end of the Yolo Bypass, near Fremont
42 Weir. Construction is expected to have adverse effects on giant garter snake aquatic habitat in
43 the Yolo Bypass area because it is near the Yolo Basin/Willow Slough subpopulation.

44 In addition to habitat loss from construction related activities in Yolo Bypass, late season
45 flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant
46 garter snake) by precluding the preparation and planting of rice fields. The methods for

1 estimating loss of rice in the bypass and results are provided in [Draft](#) BDCP Appendix 5.J,
2 Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in*
3 *the Yolo Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was
4 considered to occur late long-term.

- 5 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
6 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland
7 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat
8 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and
9 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant
10 garter snake movement habitat would be removed as a result of tidal natural communities
11 restoration.

12 Most of the effects of tidal natural communities restoration would occur in the Cache Slough and
13 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and
14 near Category 1 open space but is not near any giant garter snake occurrences and is not near or
15 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural
16 communities restoration is expected to have little to no adverse effects on giant garter snake
17 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences
18 in this area, which is already tidally influenced so it has limited value for the giant garter snake
19 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with
20 a strong tidal influence).

- 21 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
22 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
23 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.
24 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of
25 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake
26 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated
27 floodplain restoration is expected to have little to no adverse effects on giant garter snake
28 aquatic habitat because the site is not located near or between giant garter snake populations
29 identified in the draft recovery plan. As with CM4, the estimates of the effect of seasonal
30 floodplain levee construction and inundation are based on projections of where restoration may
31 occur. Actual effects are expected to be lower because sites would be selected to minimize
32 effects on giant garter snake habitat.

- 33 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
34 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected
35 habitats may result in localized ground disturbances that could temporarily remove small
36 amounts of giant garter snake habitat. Ground-disturbing activities, such as removal of
37 nonnative vegetation and road and other infrastructure maintenance, are expected to have
38 minor effects on available giant garter snake habitat and are expected to result in overall
39 improvements to and maintenance of giant garter snake habitat values over the term of the
40 BDCP. These effects cannot be quantified, but are expected to be minimal [because vegetation
41 removal would occur around existing infrastructure and roads where giant garter snake are not
42 as likely to be present. Any of these minor impacts and](#) would be avoided and minimized by the
43 AMMs listed below.

44 Passive recreation in the reserve system could result in human disturbance of giant garter
45 snakes basking in upland areas and compaction of upland burrow sites used for brumation.

1 However, AMM37, described in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft](#)
2 [BDCP Appendix 3.C, Avoidance and Minimization Measures](#), requires setbacks for trails in giant
3 garter snake habitat. With this measure in place, recreation related effects on giant garter snake
4 are expected to be minimal.

- 5 • *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the
6 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in
7 the Yolo Bypass area (CZ 2).
- 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 giant garter snake use of the surrounding habitat in the Yolo
11 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,
12 and CZ 8). Maintenance activities would include vegetation management, levee and structure
13 repair, and regrading of roads and permanent work areas. These effects, however, would be
14 reduced by AMMs and conservation actions as described below.
- 15 • *Injury and direct mortality*: Construction vehicle activity may cause injury or mortality of the
16 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the
17 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ
18 4]), the operation of equipment for land clearing, construction, conveyance facilities operation
19 and maintenance, and habitat restoration, enhancement, and management could result in injury
20 or mortality of giant garter snakes. This risk is highest from late fall through early spring, when
21 the snakes are dormant. Increased vehicular traffic associated with BDCP actions could
22 contribute to a higher incidence of road kill. However, preconstruction surveys would be
23 implemented after the project planning phase and prior to any ground-disturbing activity. Any
24 disturbance to suitable aquatic and upland sites in or near the project footprint would be
25 avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation would be
26 minimized through adjustments to project design, as practicable. Construction monitoring and
27 other measures would be implemented to avoid and minimize injury or mortality of this species
28 during construction as described in *AMM16 Giant Garter Snake*.

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

32 ***Near-Term Timeframe***

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

37 Alternative 4 would permanently and temporarily remove [345-531](#) acres of aquatic habitat and
38 [2,285-2,334](#) acres of upland habitat for giant garter snake in the study area during the near-term.
39 These effects would result from the construction of the water conveyance facilities (CM1, [151-337](#)
40 acres of aquatic and [599-648](#) acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83
41 acres of aquatic and 458 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic
42 and 1,193 acres of upland habitat), and conservation hatcheries (CM18, 35 acres of upland habitat).
43 The aquatic habitat losses would occur in tidal and nontidal wetland natural communities and rice

1 fields. The upland habitat losses would occur in cropland and grassland communities. In addition,
2 approximately ~~77-78~~ miles of channels (irrigation and drainage canals) providing giant garter snake
3 movement habitat would be removed. The habitat model likely overestimates the relative value of
4 irrigation and drainage canals in the vicinity of White Slough and south due to its proximity to
5 records that likely represent single displaced snakes, not viable populations.

6 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
7 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3,
8 *Conservation Strategy*, of the *Draft* BDCP would be 1:1 for restoration and 1:1 for protection of
9 aquatic habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that ~~345~~
10 ~~531~~ acres of aquatic habitat should be restored, ~~345-531~~ acres of aquatic habitat should be
11 protected, and ~~4,5704.668~~ acres of upland habitat should be protected for giant garter snake to
12 mitigate the near-term losses.

13 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
14 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
15 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres
16 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least
17 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, ~~CZ~~, CZ 4, and CZ 5.
18 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and ~~900~~
19 ~~acres~~ ~~900 acres~~ under Objective GGS3.1) would be restored or protected to create connections from
20 the Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
21 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected
22 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
23 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
24 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
25 ditches located in cultivated lands and suitable for giant garter snake movement would be
26 maintained and protected within the reserve system, which would include isolated valley oak trees,
27 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
28 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

29 These habitat protection and restoration measures would benefit the giant garter snake and the
30 plan's species-specific biological goals and objectives would inform the near-term protection and
31 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
32 providing connectivity between protected areas, is considered the most effective approach to giant
33 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
34 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
35 are identified as important for the recovery of the species in the draft recovery plan for the species
36 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
37 would focus on these two important subpopulations.

38 The species-specific biological 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 4 would be
43 not be adverse under NEPA, because the number of acres required to meet the typical ratios
44 described above would be only ~~345-531~~ acres of aquatic communities restored, ~~345-531~~ acres of
45 aquatic communities protected, and ~~4,5704.668~~ acres of upland communities protected.

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, AMM10 Restoration of Temporarily Affected Natural*
6 *Communities, AMM16 Giant Garter Snake, and AMM37 Recreation.* All of these AMMs include
7 elements that avoid or minimize the risk of BDCP activities affecting habitats and species adjacent to
8 work areas and storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and](#)
9 [Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in](#)
10 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and](#)
11 [Minimization Measures.](#)

12 **Late Long-Term Timeframe**

13 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and
14 53,285 acres of upland habitat for giant garter snake. Alternative 4 as a whole would result in the
15 permanent loss of and temporary effects on ~~687-873~~ acres of aquatic habitat and to ~~3,303,352~~
16 acres of upland habitat for giant garter snake during the term of the plan (3% of the total aquatic
17 habitat and 6% of the total upland habitat in the study area). The locations of these losses are
18 described above in the analyses of individual conservation measures.

19 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
20 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
21 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
22 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
23 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ
24 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective
25 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
26 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
27 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under
28 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of
29 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
30 lost due to late season flooding in Yolo Bypass as a result of CM2) (Objective GGS3.1). In addition to
31 the 6,540 acres of high value habitat targeted specifically for giant garter snake, the protection and
32 restoration of other natural communities is expected to provide additional restoration of 4,430
33 acres and protection of 3,733 acres of garter snake habitat.

34 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
35 snake by providing connectivity and maintaining irrigation and drainage channels that provide
36 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
37 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
38 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
39 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
40 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

41 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
42 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
43 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
44 connectivity between protected areas, is considered the most effective approach to giant garter

1 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
2 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
3 and are identified as important for the recovery of the species in the draft recovery plan for the
4 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
5 habitat would focus on these two important subpopulations.

6 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
7 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
8 above, as well as the restoration of managed wetland, nontidal freshwater perennial emergent
9 wetland, nontidal perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland,
10 grassland, and vernal pool complex that could overlap with the species model, would result in the
11 restoration of 3,450 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake.
12 In addition, protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool
13 complex could overlap with the species model and would result in the protection of 1,547 acres of
14 aquatic and 2,185 acres of upland giant garter snake modeled habitat.

15 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 4 would not
16 be adverse because the BDCP has committed to protecting and restoring the acreage required to
17 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter
18 snake habitat associated with Alternative 4, in the absence of other conservation actions, would
19 represent an adverse effect as a result of habitat modification and potential direct mortality of a
20 special-status species. However, with habitat protection and restoration associated with the
21 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM7,
22 AMM10, AMM16, and AMM37, the effects of Alternative 4 as a whole on giant garter snake would
23 not be adverse.

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.

30 Alternative 4 would permanently and temporarily remove ~~345-531~~ acres of aquatic habitat and
31 ~~2,285-2,334~~ acres of upland habitat for giant garter snake in the study area during the near-term.
32 These effects would result from the construction of the water conveyance facilities (CM1, ~~151-337~~
33 acres of aquatic and ~~599-648~~ acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83
34 acres of aquatic and 458 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic
35 and 1,193 acres of upland habitat), and conservation hatcheries (CM18, 35 acres of upland habitat).
36 The aquatic habitat losses would occur in tidal and nontidal wetland natural communities and rice
37 fields. The upland habitat losses would occur in cropland and grassland communities. In addition,
38 approximately 77 miles of channels (irrigation and drainage canals) ~~providing~~ **providing** giant
39 garter snake movement habitat would be removed. The habitat model likely overestimates the
40 relative value of irrigation and drainage canals in the vicinity of White Slough and south due to its
41 proximity to records that likely represent single displaced snakes, not viable populations.

42 Typical CEQA 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.

1 Conservation Strategy, of the Draft BDCP would be 1:1 for restoration and 1:1 for protection of
2 aquatic habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that ~~345~~
3 ~~531~~ acres of aquatic habitat should be restored, ~~345-531~~ acres of aquatic habitat should be
4 protected, and ~~4,570~~~~4,668~~ acres of upland habitat should be protected for giant garter snake to
5 mitigate the near-term losses.

6 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
7 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. ~~Lands~~
8 ~~to~~ Lands to be protected and restored in the near term specifically for the giant garter snake total
9 3,900 acres (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands
10 including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, ~~CZ~~,
11 ~~CZ~~ 4, and CZ 5. Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective
12 GGS1.4 and ~~900 acres~~900 acres under Objective GGS3.1) would be restored or protected to create
13 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
14 snake historical range. Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value
15 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of habitat
16 conserved to habitat affected (habitat affected includes uplands periodically flooded and rice lost
17 due to late season flooding in Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown
18 number of irrigation and drainage ditches located in cultivated lands and suitable for giant garter
19 snake movement would be maintained and protected within the reserve system, which would
20 include isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant
21 groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective
22 CLNC1.3).

23 These habitat protection and restoration measures would benefit the giant garter snake and the
24 plan's species-specific biological goals and objectives would inform the near-term protection and
25 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
26 providing connectivity between protected areas, is considered the most effective approach to giant
27 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
28 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
29 and are identified as important for the recovery of the species in the draft recovery plan for the
30 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
31 habitat would focus on these two important subpopulations.

32 The natural community restoration and protection activities are expected to be concluded during
33 the first 10 years of plan implementation, which is close enough in time to the occurrence of impacts
34 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient
35 to support the conclusion that the near-term effects of Alternative 4 would be less than significant
36 under CEQA, because the number of acres required to meet the typical ratios described above would
37 be only ~~345-531~~ acres of aquatic communities restored, ~~345-531~~ acres of aquatic communities
38 protected, and ~~4,570~~~~4,668~~ acres of upland communities protected.

39 The Plan also includes commitments to implement AMM1–AMM7, AMM10, AMM16, and AMM37. All
40 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats
41 and species adjacent to work areas and storage sites. The AMMs are described in detail in Appendix
42 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM–6 is
43 provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix 3.C,
44 Avoidance 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 4 as a whole would result in the
4 permanent loss of and temporary effects on ~~687,873~~ acres of aquatic habitat and to ~~3,303,352~~
5 acres of upland habitat for giant garter snake during the term of the plan (3% of the total aquatic
6 habitat in the study area and 6% of the total upland habitat in the study area). The locations of these
7 losses are 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
21 other natural communities is expected to provide additional restoration of 4,430 acres and
22 protection of 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 populations of giant garter snakes in the Plan Area and
36 are identified as important for the recovery of the species in the draft recovery plan for the species
37 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
38 would focus on these two important subpopulations.

39 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
40 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
41 above, as well as the restoration of managed wetland, nontidal freshwater perennial emergent
42 wetland, nontidal perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland,
43 grassland, and vernal pool complex that could overlap with the species model, would result in the
44 restoration of 3,450 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake.
45 In addition, protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool

1 complex could overlap with the species model and would result in the protection of 1,547 acres of
2 aquatic and 2,185 acres of upland giant garter snake modeled habitat.

3 The BDCP also includes AMM1–AMM7, AMM10, AMM16, and AMM37, which are directed at
4 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of
5 the conservation measures. Considering the protection and restoration provisions, which would
6 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for
7 habitats lost to construction and restoration activities, implementation of Alternative 4 as a whole
8 would not result in a ~~substantial adverse effects~~ **significant impact** through habitat modifications and
9 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
10 giant garter snake habitat and potential mortality of snakes would have a less-than-significant
11 impact on giant garter snake under CEQA.

12 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

13 Construction activities outside the project footprint but within 200 feet of construction associated
14 with water conveyance facilities, conservation components and ongoing habitat enhancement, as
15 well as operation and maintenance of above-ground water conveyance facilities, including the
16 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized
17 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of
18 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,
19 AMM16, and AMM37, which would be in effect throughout the plan’s construction phase.

20 The use of mechanical equipment during water conveyance facilities construction could cause the
21 accidental release of petroleum or other contaminants that could affect giant garter snake or its
22 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake
23 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize
24 the likelihood of such spills and would ensure measures are in place to prevent runoff from the
25 construction area and potential effects of sediment or dust on giant garter snake or its prey.

26 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species
27 that feed on aquatic species, including giant garter snake. The operational impacts of new flows
28 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.
29 Results indicated that changes in total mercury levels in water and fish tissues due to future
30 operational conditions were insignificant (see [Appendix D, Substantive BDCP Revisions, ~~in~~ of this](#)
31 [RDEIR/SDEIS/BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5](#)).

32 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
33 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
34 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
35 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase
36 bioavailability of mercury. Increased methylmercury associated with natural community and
37 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,
38 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their
39 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest
40 methylation rates are associated with high tidal marshes that experience intermittent wetting and
41 drying and associated anoxic conditions (Alpers et al. 2008). Along with minimization and
42 mitigation measures and adaptive management and monitoring, *CM12 Methylmercury Management*
43 [\(as revised in Appendix D, Substantive BDCP Revisions, ~~in~~ of this RDEIR/SDEIS\)](#) is expected to reduce

1 the amount of methylmercury resulting from the restoration of natural communities and
2 floodplains.

3 Extant populations of giant garter snake within the study area are known only from the upper Yolo
4 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury
5 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low
6 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent
7 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough
8 giant garter snake population. Effects on giant garter snake from increased methylmercury
9 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and
10 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury
11 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,
12 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.
13 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase
14 methylmercury production, although production would be minimized by *CM12 Methylmercury*
15 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not
16 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to
17 decrease risk to the giant garter snake, although snakes could prey on individuals that have been
18 exposed to methylmercury during the previous season.

19 The potential mobilization or creation of methylmercury within the study area varies with site-
20 specific conditions and would need to be assessed at the project level. Measures described in *CM12*
21 *Methylmercury Management* include provisions for project-specific Mercury Management Plans.
22 Along with avoidance and minimization measures and adaptive management and monitoring, CM12
23 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and
24 floodplain restoration on giant garter snake.

25 **NEPA Effects:** Implementation of the AMMs and Environmental Commitment 12 Methylmercury
26 Management listed above as part of implementing Alternative 4 would avoid the potential for
27 substantial adverse effects on giant garter snakes, either indirectly or through habitat modifications.
28 These AMMs would also avoid and minimize effects that could substantially reduce the number of
29 giant garter snakes or restrict the species' range. Therefore, the indirect effects of Alternative 4
30 would not have an adverse effect on giant garter snake.

31 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
32 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and
33 upland habitats. The use of mechanical equipment during construction could cause the accidental
34 release of petroleum or other contaminants that could impact giant garter snake or its prey. The
35 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also
36 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,
37 AMM16, and AMM37-as part of Alternative 4 construction, operation and maintenance, the BDCP
38 would avoid ~~and or minimize~~ the potential for ~~substantial adverse effects~~ significant impacts on giant
39 garter snakes, either indirectly or through habitat modifications. ~~Alternative 4 would not result in a~~
40 ~~substantial reduction in numbers or a restriction in the range of giant garter snakes.~~ Therefore, the
41 indirect effects of BDCP Alternative 4 would have a less-than-significant impact on giant garter
42 snakes.

43 Giant garter snake 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 giant garter snakes, and, therefore, would have a less-than-significant impact on giant
3 garter snakes.

4 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White**
5 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

6 Implementation of Alternative 4 would not introduce a substantial barrier to the movement among
7 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife
8 Refuge, and the Delta in the study area.

9 **NEPA Effects:** Alternative 4 would not adversely affect connectivity among giant garter snakes in the
10 Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta in
11 the study area.

12 **CEQA Conclusion:** Alternative 4 would have a less-than-significant impact on connectivity among
13 giant garter snakes in the study area and therefore no mitigation is required.

14 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of**
15 **Implementation of Conservation Components**

16 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would
17 occur intermittently from as early as mid-November through as late as mid-May. The core
18 operations would occur during the winter/spring period, which corresponds mostly with the giant
19 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter
20 snakes that occur in the bypass during the active season could overwinter in the bypass during the
21 inactive season: these snakes may be vulnerable to inundation of the bypass and could be drowned
22 or displaced from overwintering sites. However, most typically, Fremont Weir "notch" operations
23 would occur on the shoulders of time periods in which the Sacramento River rises enough for
24 Fremont Weir to overtop passively, without the proposed project. Project-associated inundation of
25 areas that would not otherwise have been inundated is expected to occur in no more than 30% of all
26 years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and
27 during those years notch operations would not typically affect the maximum extent of inundation.
28 Currently, in more than half of all years, an area greater than the area that would be inundated as a
29 result of covered activities is already inundated during the snake's inactive season (Kirkland pers.
30 comm.). Duration of inundation may also be an important factor determining effects on
31 overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes
32 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of
33 inundation the snakes can survive while overwintering in their burrows.

34 ~~BDCP~~ Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants, of the Draft BDCP* provides
35 the method used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
36 periodic inundation could affect giant garter snakes overwintering in upland areas ranging from an
37 estimated 582 acres of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres
38 during a 4,000-cfs notch flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high
39 value habitat and 514 acres of moderate value habitat.

40 As noted above under the discussion of habitat loss from construction-related activities in Yolo
41 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic
42 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662

1 acres of rice fields (~~BDCP~~ see Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant*
2 *Garter Snake Summer Foraging Habitat in the Yolo Bypass*, ~~of the Draft BDCP~~). This analysis
3 concludes that the estimated loss of rice is 1,662 acres which was considered to occur late long-
4 term. Restoration and protection of 2,740 acres of rice land or habitat of equivalent value for the
5 giant garter snake would achieve a 1:1 ratio of habitat conserved to habitat affected (habitat affected
6 includes uplands periodically flooded and rice lost due to late season flooding in Yolo Bypass as a
7 result of CM2).

8 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland
9 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated
10 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing
11 levees would be breached and the newly constructed setback levees would be inundated through
12 seasonal flooding. The restored floodplain will include a range of elevations from low-lying areas
13 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,
14 every 10 years or more). There are no records of giant garter snakes in the vicinity of where
15 floodplain restoration is expected to occur.

16 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285
17 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake
18 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic
19 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

20 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with
21 implementing Alternative 4 are not expected to result in substantial adverse effects on giant garter
22 snakes, either directly or through habitat modifications, as it would not result in a substantial
23 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 4
24 would not adversely affect the species.

25 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
26 various parts of the study area would periodically affect a total of approximately 2,008 acres of
27 upland habitat for giant garter snake. The inundation could affect overwintering snakes. Project-
28 associated inundation of areas that would not otherwise have been inundated is expected to occur in
29 no more than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated
30 70% of all years, and during those years notch operations would not typically affect the maximum
31 extent of inundation. Currently, in more than half of all years, an area greater than the area that will
32 be inundated as a result of covered activities is already inundated during the snake's inactive season
33 (Kirkland pers. comm.).

34 Therefore, increased inundation in the Yolo Bypass as a result of BDCP is expected to have a minimal
35 effect on the Yolo Basin/Willow Slough population. Therefore, implementing Alternative 4, including
36 AMM1-AMM7, AMM10, and AMM16, would not be expected to result in substantial adverse effects
37 on giant garter snakes, either directly or through habitat modifications, because it would not result
38 in a substantial reduction in numbers or a restriction in the range of giant garter snakes. Periodic
39 effects of inundation under Alternative 4 would have a less-than-significant impact on the species.

40 **Western Pond Turtle**

41 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland
42 nesting and overwintering habitat. Further details regarding the habitat model, including
43 assumptions on which the model is based, are provided in ~~BDCP~~ Appendix 2A, Section 2A.30,

1 *Western Pond Turtle*, [of the Draft BDCP](#). The model quantified two types of upland nesting and
2 overwintering habitat, including upland habitat in natural communities as well as upland in
3 agricultural areas adjacent to aquatic habitats. Both of these upland habitat types are combined for
4 this analysis. Factors considered in assessing the value of affected aquatic habitat are natural
5 community type and availability of adjacent nesting and overwintering habitat. The highest value
6 aquatic habitat types in the study area consist of nontidal freshwater perennial emergent wetlands
7 and ponds adjacent to suitable nesting and overwintering habitat (Patterson pers. comm.). Less
8 detail is provided on effects on dispersal habitat because, although dispersal habitat is important for
9 maintaining and increasing distribution and genetic diversity, turtles have been known to travel
10 over many different land cover types; therefore, this habitat type is not considered limiting. The
11 value of dispersal habitat depends less on the habitat type itself than on the proximity of that habitat
12 type to high-value aquatic and nesting and overwintering habitat.

13 Construction and restoration associated with Alternative 4 conservation measures would result in
14 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table
15 12-4-23. The majority of these losses would take place over an extended period of time as tidal
16 marsh is restored in the study area.

17 Full implementation of Alternative 4 would also include the following biological objectives over the
18 term of the BDCP to benefit the western pond turtle ([BDCP-see Chapter 3, Conservation Strategy, in](#)
19 [the Draft BDCP](#)).

- 20 ● Protect or restore 142,200 acres of high-value natural communities and covered species
21 habitats (Objective L1.1, associated with CM3).
- 22 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
23 accommodate sea level rise. Minimum restoration targets for tidal natural communities in
24 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in
25 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA
26 (Objective L1.3, associated with CM2, CM3, and CM4).
- 27 ● Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),
28 include sufficient transitional uplands along the fringes of restored brackish and freshwater
29 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow
30 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
31 associated with CM3, CM4, and CM8).
- 32 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
33 recolonization of vegetation, desirable natural community vegetation is regenerated, and
34 structural diversity is promoted, or implement management actions that mimic those natural
35 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 36 ● Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 37 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
38 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
39 TFEWNC1.1, associated with CM3 and CM4).
- 40 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
41 and nontidal freshwater emergent wetland natural communities, with suitable habitat
42 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
43 associated with CM3 and CM10).

- 1 • Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly
2 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 3 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 4 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
5 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
6 CM3).
- 7 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
8 lands that occur in cultivated lands within the reserve system, including isolated valley oak
9 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
10 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
11 with CM3 and CM11).

12 As explained below, with the restoration and protection of these amounts of habitat, in addition to
13 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes
14 and would be less than significant for CEQA purposes.

1 **Table 12-4-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 4^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic (acres)	<u>237264</u>	<u>237264</u>	<u>2,098</u>	<u>2,098</u>	NA	NA
	Upland (acres) ^e	<u>279286</u>	<u>279286</u>	<u>2,102</u>	<u>2,102</u>	NA	NA
	Aquatic (miles)	<u>97</u>	<u>97</u>	<u>35</u>	<u>35</u>	NA	NA
Total Impacts CM1 (acres)		<u>51655</u>	<u>516550</u>	<u>2,166</u>	<u>2,166</u>	NA	NA
		<u>0</u>		<u>2,179</u>	<u>2,179</u>		
CM2–CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres) ^e	414	1,028	119	136	283–798	331
	Aquatic (miles)	25	109	3	4	0	0
Total Impacts CM2–CM18 (acres)		496	1,142	142	180	283–798	331
TOTAL IMPACTS CM1–CM18 (acres)		<u>1,0121</u>	<u>1,6581</u>	<u>2,308</u>	<u>2,346</u>	283–798	331
		<u>.046</u>	<u>692</u>	<u>2,321</u>	<u>2,359</u>		

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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.

^e 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 4 conservation measures would result in the permanent and temporary loss of up to
5 2,4932,497 acres of aquatic habitat and 1,511-1,527 acres of upland nesting and overwintering
6 habitat (Table 12-4-23). ~~There are three western pond turtle occurrences that overlap with the CM1~~
7 ~~footprint and a number of additional occurrences within the vicinity (Figure 12-16).~~ Activities that
8 would result in the temporary and permanent loss of western pond turtle modeled habitat are
9 conveyance facilities and transmission line construction, geotechnical investigations, and
10 establishment and use of RTM, borrow, and spoils areas (CM1), Yolo Bypass improvements (CM2),
11 tidal habitat restoration (CM4) floodplain restoration (CM5), and riparian habitat restoration (CM7).
12 Habitat enhancement and management activities (CM11), such as 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 western pond turtle habitat. The activity accounting for most
16 (80%) of the habitat loss or conversion would be *CM4 Tidal Natural Communities Restoration*. Each

1 of these individual activities is described below. A summary statement of the combined impacts and
2 NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- 3 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would
4 result in the permanent loss of approximately ~~237-264~~ acres of aquatic habitat and ~~279-286~~
5 acres of upland nesting and overwintering habitat for the western pond turtle in the study area
6 (Table 12-4-23). Development of the water conveyance facilities would also result in the
7 temporary removal of up to ~~2,0982,102~~ acres of aquatic habitat and ~~68-77~~ acres of nesting and
8 overwintering habitat for the western pond turtle in the study area (see Table 12-4-23).
9 Approximately ~~17-7~~ miles of channels providing western pond turtle movement habitat would
10 be removed and ~~24-5~~ miles would be temporarily disturbed. There are ~~three-four~~ western pond
11 turtle occurrences that overlap with the CM1 footprint in CZ 2, ~~one occurrence that overlaps~~
12 ~~with an RTM area on the southern tip of Bouldin Island in CZ 5, and one occurrence that~~
13 ~~overlaps with an RTM area along Twin Cities Road in CZ 4/ around Clifton Court Forebay and in~~
14 ~~CZ 5 scattered throughout the Delta.~~ The majority of the permanent loss of aquatic habitat and
15 nesting and overwintering habitat would be near Clifton Court Forebay in CZ 8. Refer to the
16 Terrestrial Biology Map ~~Bb~~ook [in Appendix A of this RDEIR/SDEIS](#) for a detailed view of
17 Alternative 4 construction locations. The aquatic habitat in the Clifton Court Forebay area is
18 considered to be of reasonably high-value because it consists of agricultural ditches in or near
19 known species occurrences. The nesting and overwintering and dispersal habitat that would be
20 lost consists primarily of cultivated lands with some small portion of ruderal grassland habitat.
21 Except for remnant, uncultivated patches, the cultivated lands are not suitable for nesting and
22 overwintering unless left fallow. Construction of the water conveyance facilities would also
23 affect dispersal habitat, which is primarily cultivated lands. While there are western pond turtle
24 occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6, this effect is widely dispersed
25 because of the long, linear nature of the pipeline footprint.

26 An estimated ~~201-162~~ of the total ~~516-549 aquatic and upland~~ acres ~~combined~~ and ~~6-4~~ of the ~~9~~
27 ~~7~~miles would be lost as storage areas for reusable tunnel material, which would likely be moved
28 to other sites for use in levee build-up and restoration, and the affected area would likely be
29 restored: while this effect is categorized as permanent because there is no assurance that the
30 material would eventually be moved, the effect would likely be temporary. Furthermore, the
31 amount of storage area needed for reusable tunnel material is flexible and the footprint used in
32 the effects analysis is based on a worst case scenario: the actual area to be affected by reusable
33 tunnel material storage would likely be less than the estimated acreage.

- 34 • *CM2 Yolo Bypass Fisheries Enhancement:* Improvements in the Yolo Bypass would result in the
35 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres
36 of upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles
37 of channels providing western pond turtle movement habitat would be permanently or
38 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDDB
39 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in
40 the Yolo Bypass Wildlife Area (California Department of Fish and Game 2012z).
- 41 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result
42 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting
43 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of
44 channels providing western pond turtle movement habitat would be removed as a result of
45 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions
46 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat

1 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse
2 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create
3 suitable, slow-moving freshwater slough and marsh habitat.

4 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent
5 wetland, and managed wetland as habitat, almost of the Suisun Marsh pond turtle observations
6 have been in the interior drainage ditches or near water control structures not hydrologically
7 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an
8 aquatic class type called *drainage ditches* and therefore an effect on this habitat type cannot be
9 calculated, it is likely that this general type of habitat accounts for a very small portion of the
10 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the
11 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering
12 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely
13 function as the primary nesting and overwintering habitat. The nesting and overwintering
14 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is
15 adjacent to undeveloped grassland habitat.

16 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting
17 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-
18 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.
19 Because the estimates of the effect of tidal inundation are based on projections of where
20 restoration may occur, actual effects are expected to be lower because sites would be selected to
21 minimize effects on western pond turtle habitat (see AMM17 in [Appendix 3.C. Avoidance and](#)
22 [Minimization Measures, of the Draft BDCP-BDCP Appendix 3.C](#)).

- 23 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
24 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
25 approximately 53 acres of aquatic habitat and 33 acres of upland habitat for western pond
26 turtle. Approximately 3 miles of channels providing western pond turtle movement habitat
27 would be removed as a result of floodplain restoration. Although there are no CNDDDB
28 occurrences of the western pond turtle in the areas where floodplain restoration is likely to
29 occur, the species is known to occur along the San Joaquin River to the south in the San Joaquin
30 River National Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain
31 levee construction and inundation are based on projections of where restoration may occur.
32 Actual effects are expected to be lower because sites would be selected to minimize effects on
33 western pond turtle habitat.
- 34 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural
35 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of
36 upland nesting and overwintering habitat for western pond turtle.
- 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 western pond turtle habitat. Ground-disturbing activities, such as removal of
41 nonnative vegetation and road and other infrastructure maintenance, are expected to have
42 minor adverse effects on available western pond turtle habitat and are expected to result in
43 overall improvements to and maintenance of western pond turtle habitat values over the term
44 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.

1 Management of the 6,600 acres of managed wetlands to be protected for waterfowl and
2 shorebirds is not expected to result in overall adverse effects for the western pond turtle.
3 Management actions that would improve wetland quality and diversity on managed wetlands
4 include control and eradication of invasive plants; maintenance of a diversity of vegetation types
5 and elevations, including upland areas to provide flood refugia; water management and leaching
6 to reduce salinity; and enhancement of water management infrastructure (improvements to
7 enhance drainage capacity, levee maintenance). These management actions could benefit the
8 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and
9 adaptively managed to ensure that management options are implemented to avoid adverse
10 effects on the western pond turtle.

- 11 ● Operations and maintenance: Ongoing maintenance of BDCP facilities is expected to have little if
12 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of
13 the above-ground water conveyance facilities and restoration infrastructure could result in
14 ongoing but periodic disturbances that could affect western pond turtle use where there is
15 suitable habitat in the study area. 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 by AMMs and conservation actions described below.
- 18 ● Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
19 western pond turtles. If turtles reside where conservation measures are implemented (most
20 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land
21 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,
22 enhancement, and management could result in injury or mortality of western pond turtles.
23 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable
24 aquatic or upland habitat for the western pond turtle, and turtles found would be relocated
25 outside the construction areas, as required by the AMMs listed below.

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 effects of
33 construction would not be adverse under NEPA.

34 Alternative 4 would temporarily and permanently remove ~~2,440,471~~ acres of aquatic habitat and
35 ~~880,896~~ acres of upland nesting and overwintering habitat for western pond turtle in the near-term.
36 These effects would result from water conveyance facilities construction (CM1, ~~2,335,366~~ acres of
37 aquatic and ~~347,363~~ acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic
38 and 249 acres of upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres
39 of upland habitats), and riparian restoration (CM7, 4 acres of upland habitat).

40 Typical project-level mitigation ratios for those natural communities that would be affected and that
41 are identified in the biological goals and objectives for western pond turtle in Chapter 3.
42 ***Conservation Strategy***, of the ***Draft*** BDCP would be 1:1 for restoration and 1:1 for protection of
43 aquatic habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that

1 2,440,471 acres of aquatic habitat should be restored, 2,440,471 acres of aquatic habitat should
2 be protected, and 1,760,179 acres of upland habitat should be protected for western pond turtle to
3 mitigate the near-term losses.

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 near-term
8 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
9 Objective NFEW/NPANC1.1, MWNC1.1) ~~and~~ and up to 2,000 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. Additionally, basking platforms will be installed as needed in restored
14 freshwater marsh to benefit the western pond turtle.

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 impacts of construction to
17 constitute adequate mitigation. Because the number of acres required to meet the typical ratios
18 described above would be only 2,440,471 acres of aquatic communities protected, 2,440,471
19 acres restored, and 1,760,179 acres of upland communities protected, the 24,350 acres of aquatic
20 and 2,000 acres of upland habitats restored or created in the near-term Plan goals, and the
21 additional detail in the biological goals for western pond turtle, are more than sufficient to support
22 the conclusion that the near-term impacts of habitat loss and direct mortality under Alternative 4 on
23 western pond turtles would not be adverse.

24 The plan also contains 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*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM17 Western*
29 *Pond Turtle*. These AMMs include elements that would avoid or minimize the risk of affecting
30 habitats and species adjacent to work areas and storage sites. The AMMs are described in detail in
31 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of](#)
32 [AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix](#)
33 [3.C, Avoidance and Minimization Measures.](#)

34 **Late Long-Term Timeframe**

35 Based on the habitat model, the study area supports approximately 81,666 acres of aquatic and
36 28,864 acres of upland habitat for western pond turtle. Alternative 4 would remove 2,493,524
37 acres of aquatic habitat and 1,511,527 acres of upland nesting and overwintering habitat for
38 western pond turtle in the late long-term.

39 Implementation of Alternative 4 as a whole would increase the extent and distribution of high-value
40 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.
41 While the extent of dispersal habitat is expected to be reduced by approximately 95%, this habitat is
42 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor
43 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

1 The conservation strategy for western pond turtle involves restoration and protection of aquatic
2 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
3 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
4 addressed at the landscape and natural community levels. The BDCP has committed to late long-
5 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
6 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) ~~and~~ and up to 8,000 acres of upland habitat (Objective
7 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
8 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
9 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
10 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
11 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for
12 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be
13 installed as needed in restored freshwater marsh to benefit the western pond turtle.

14 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
15 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
16 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
17 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
18 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
19 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
20 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
21 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
22 rabbit.

23 The study area represents only a small portion of the range of the western pond turtle in California
24 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
25 temporary loss or conversion of habitat for the western pond turtle, and other effects described
26 above, are not expected to result in an adverse effect on the long-term survival and recovery of
27 western pond turtle because for the following reasons.

- 28 • The study area represents a small portion of the species' entire range.
- 29 • Only 1% of the habitat in the study area would be removed or converted.

30 The BDCP's beneficial effects analysis (~~BDCP~~ see Chapter 5, Section 5.6, *Effects on Covered Wildlife*
31 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
32 above, as well as the restoration of managed wetland, nontidal freshwater perennial emergent
33 wetland, nontidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent
34 wetland, grassland, valley foothill riparian, that could overlap with the species model, would result
35 in the restoration of 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western
36 pond turtle. In addition, protection of cultivated land, managed wetland, grassland, and
37 valley/foothill riparian could overlap with the species model and would result in the protection of
38 1,281 acres of aquatic and 4,993 acres of upland western pond turtle modeled habitat.

39 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 4 would
40 not be adverse because the BDCP has committed to protecting and restoring the acreage required to
41 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond
42 turtle habitat associated with Alternative 4, in the absence of other conservation actions, would
43 represent an adverse effect as a result of habitat modification and potential direct mortality of a
44 special-status species. However, with habitat protection and restoration associated with the

1 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
2 AMM10, and AMM17, the effects of Alternative 4 as a whole on western pond turtle would not be
3 adverse.

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 effects of construction would be less than significant under CEQA.

10 Alternative 4 would temporarily and permanently remove 2,440,471 acres of aquatic habitat and
11 880,896 acres of upland nesting and overwintering habitat for western pond turtle in the near-term.
12 These effects would result from water conveyance facilities construction (CM1, 2,335,366 acres of
13 aquatic and 347,363 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic
14 and 249 acres of upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres
15 of upland habitats) and riparian restoration (CM7, 4 acres of upland habitat) (Table 12-4-23).

16 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
17 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3,
18 Conservation Strategy, of the Draft BDCP would be 1:1 for restoration and 1:1 for protection of
19 aquatic habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that
20 2,440,471 acres of aquatic habitat should be restored, 2,440,471 acres of aquatic habitat should
21 be protected, and 1,760,179 acres of upland habitat should be protected for western pond turtle to
22 mitigate the near-term losses.

23 The conservation strategy for western pond turtle involves restoration and protection of aquatic
24 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
25 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
26 addressed at the landscape and natural community levels. The BDCP has committed to near-term
27 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
28 Objective NFEW/NPANC1.1, MWNC1.1) ~~and~~ and up to 2,000 acres of upland habitat (Objective
29 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
30 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
31 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
32 undisturbed grassland. Additionally, basking platforms will be installed as needed in restored
33 freshwater marsh to benefit the western pond turtle.

34 The natural community restoration and protection activities would be concluded in the first 10
35 years of plan implementation, which is close enough in time to the impacts of construction to
36 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet
37 the typical ratios described above would be only 2,440,471 acres of aquatic communities
38 protected, 2,440,471 acres of aquatic communities, and 1,760,179 acres of upland communities
39 protected, the 24,350 acres of aquatic and 2,000 acres of upland habitats restored or created in the
40 near-term Plan goals, and the additional detail in the biological goals for western pond turtle, are
41 more than sufficient to support the conclusion that the near-term impacts of habitat loss and direct
42 mortality under Alternative 4 on western pond turtles would be less than significant.

1 In addition, the plan also contains commitments to implement AMM1–AMM6, AMM10, and AMM17,
2 which include elements that would avoid or minimize the risk of directly and indirectly affecting
3 habitats and species habitats adjacent to work areas and storage sites. The AMMs are described in
4 detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated](#)
5 [version of AMM–6 is provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP](#)
6 [Appendix 3.C, Avoidance and Minimization Measures.](#)

7 **Late Long-Term Timeframe**

8 Based on the habitat model, the study area supports approximately 81,666 acres of aquatic and
9 28,864 acres of upland habitat for western pond turtle. Alternative 4 would remove ~~2,4932,524~~
10 acres of aquatic habitat and ~~1,5111,527~~ acres of upland nesting and overwintering habitat for
11 western pond turtle in the late long-term.

12 Implementation of Alternative 4 as a whole would increase the extent and distribution of high-value
13 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.
14 While the extent of dispersal habitat is expected to be reduced by approximately ~~15~~%, this habitat is
15 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor
16 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

17 The conservation strategy for western pond turtle involves restoration and protection of aquatic
18 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
19 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
20 addressed at the landscape and natural community levels. The BDCP has committed to late long-
21 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
22 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) ~~and~~ and up to 8,000 acres of upland habitat (Objective
23 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
24 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
25 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
26 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
27 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for
28 giant garter snake are also expected to benefit the species. Additionally, basking platforms will be
29 installed as needed in restored freshwater marsh to benefit the western pond turtle.

30 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
31 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
32 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
33 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
34 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
35 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
36 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
37 western pond turtles because riparian-adjacent grassland is an important habitat characteristic for
38 the rabbit.

39 The study area represents only a small portion of the range of the western pond turtle in California
40 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
41 temporary loss or conversion of habitat for the western pond turtle, and other effects described
42 above, are not expected to result in an adverse effect on the long-term survival and recovery of
43 western pond turtle because for the following reasons.

- 1 • The study area represents a small portion of the species' entire range.
- 2 • Only 1% of the habitat in the study area would be removed or converted.

3 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
4 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
5 above, as well as the restoration of managed wetland, nontidal freshwater perennial emergent
6 wetland, nontidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent
7 wetland, grassland, valley foothill riparian, that could overlap with the species model, would result
8 in the restoration of 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western
9 pond turtle. In addition, protection of cultivated land, managed wetland, grassland, and
10 valley/foothill riparian could overlap with the species model and would result in the protection of
11 1,281 acres of aquatic and 4,993 acres of upland western pond turtle modeled habitat.

12 The loss of western pond turtle habitat associated with Alternative 4 would represent ~~an adverse~~
13 ~~effect~~ *a significant impact* as a result of special-status species habitat modification and the potential
14 for direct mortality of turtles. However, considering the habitat restoration and protection
15 associated with the conservation components, guided by landscape-scale goals and objectives and
16 by AMM1–AMM6, AMM10, and AMM17, which would be in place ~~throughout the construction~~
17 ~~phaseduring all project activities~~, the loss of habitat and potential mortality would not have ~~an~~
18 ~~adverse effect~~ *a significant impact* on western pond turtle. Therefore, the loss of western pond turtle
19 habitat and potential mortality of turtles from Alternative 4 would have a less-than-significant
20 impact on western pond turtle.

21 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

22 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily
23 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the
24 western pond turtle. Construction activities outside the construction footprint but within 200 feet of
25 water conveyance facilities, conservation components, and ongoing habitat enhancement, as well as
26 operation and maintenance of above-ground water conveyance facilities, including the transmission
27 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on
28 western pond turtle habitat, and temporary noise and visual disturbances over the term of the
29 BDCP.

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 pond turtle or its
32 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond
33 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and
34 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to
35 prevent runoff from the construction area and potential effects of sediment or dust on western pond
36 turtle or its prey.

37 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be
38 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the
39 salinity of water in Suisun Marsh would generally increase as a result of water operations and
40 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full
41 implementation of the BDCP show salinity to double by the late long-term compared with current
42 conditions during late fall and winter months. Changes in salinity would not be uniform across
43 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than

1 others, and most of the salinity increase would occur during the fall and winter. Western pond
2 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and
3 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh
4 pond turtle observations have been in the interior drainage ditches or near water control structures
5 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity
6 would occur. Therefore, the potential effects associated with changes in salinity are not expected to
7 adversely affect western pond turtles.

8 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 4,
9 the BDCP would avoid the potential for substantial adverse effects on western pond turtles, either
10 directly or through habitat modifications. These AMMs would also avoid and minimize effects that
11 could substantially reduce the number of western pond turtles or restrict the species range.
12 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on western pond
13 turtle.

14 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance
15 as well as construction-related noise and visual disturbances could impact western pond turtle in
16 aquatic and upland habitats. The use of mechanical equipment during construction could cause the
17 accidental release of petroleum or other contaminants that could affect western pond turtle or its
18 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle
19 habitat could also have a negative effect on the species or its prey. Changes in water salinity would
20 have a less-than-significant impact on western pond turtles because most of the salinity increases
21 would occur in areas not used extensively by western pond turtles.

22 With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 4 construction,
23 operation, and maintenance, the BDCP would avoid the potential for **substantial adverse**
24 **effectssignificant impacts** on western pond turtles, either indirectly or through habitat
25 modifications, and would not result in a substantial reduction in numbers or a restriction in the
26 range of western pond turtles. The indirect effects of BDCP Alternative 4 would have a less-than-
27 significant impact on western pond turtles.

28 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of** 29 **Implementation of Conservation Components**

30 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect
31 western pond turtle and its upland habitat. ~~BDCP~~ Appendix 5.J, *Effects on Natural Communities,*
32 *Wildlife, and Plants, of the Draft BDCP* provides the method used to estimate periodic inundation
33 effects in the Yolo Bypass. Based on this method, periodic inundation could affect from an estimated
34 283 acres of habitat during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000
35 cfs notch flow (Table 12-4-23). This effect would occur during an estimated maximum of 30% of
36 years, in areas that are already inundated in more than half of all years; therefore, these areas are
37 expected to provide only marginal overwintering habitat for the western pond turtle under Existing
38 Conditions. Furthermore, Yolo Bypass inundation is not expected to affect nesting western pond
39 turtles because operations would not occur during the nesting season (approximately May through
40 October). Therefore, Yolo Bypass operations are expect to have a minimal effect, if any, on western
41 pond turtles in the Yolo Bypass.

42 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland
43 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored
44 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat

1 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not
2 expected to be inundated during the nesting season, however, turtle hatchlings may overwinter in
3 the nest and could be affected by flooding. Restored floodplains would transition for areas that flood
4 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);
5 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,
6 where frequent flooding occurs.

7 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5
8 associated with implementing Alternative 4 are not expected to result in substantial adverse effects
9 either directly or through habitat modifications, as it would not result in a substantial reduction in
10 numbers or a restriction in the range of western pond turtles. Therefore, Alternative 4 would not
11 adversely affect the species.

12 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
13 various parts of the study area would periodically affect 283-798 acres from CM2 and approximately
14 331 acres from CM5 of upland habitat for western pond turtle. These acreages represent only 1% of
15 the total upland western pond turtle habitat in the study area. Most of the increase in inundation
16 would occur in the winter and early spring months, when western pond turtles may be in the water
17 or overwintering and occupying upland habitats. Therefore, implementing Alternative 4, including
18 AMM1-AMM6, AMM10, and AMM17, would not be expected to result in ~~substantial adverse~~
19 ~~effects/significant impacts~~ on western pond turtle, either directly or through habitat modifications,
20 because it would not result in a substantial reduction in numbers or a restriction in the range of
21 western pond turtles. Periodic effects of inundation under Alternative 4 would have a less-than-
22 significant impact on the species.

23 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville's Horned Lizard**

24 This section describes the effects of Alternative 4 on the silvery legless lizard, San Joaquin
25 coachwhip and Blainville's horned lizard (special-status reptiles). The habitat types used to assess
26 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),
27 ~~(Figure 12-17). There are isolated patches of sandy habitat in the vicinity of Oakley and along the~~
28 ~~railroad in the East Bay Regional Park Legless Lizard Preserve that are not shown in Figure 12-17~~
29 ~~because project mapping was not available at this level of detail. Furthermore, none of these areas~~
30 ~~would be affected by construction or restoration activities and this species is not discussed any~~
31 ~~further, which would not be affected by construction or restoration activities. This species is not~~
32 ~~discussed any further.~~

33 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland
34 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and
35 West Canal (CZ 8). The habitat types used to assess effects on the Blainville's horned lizard are the
36 same as those for the whipsnake in CZ 7 and CZ 8. There is also potential habitat for the horned
37 lizard to occur in grassland habitat around Stone Lake (CZ 4). Although the expected range for San
38 Joaquin coachwhip and Blainville's horned lizard extends into the study area, there are no records
39 for either of these species within the study area (California Department of Fish and Wildlife 2013

40 Alternative 4 is expected to result in the temporary and permanent removal of habitat that special-
41 status reptiles uses for cover and dispersal (Table 12-4-24). BDCP actions that could affect this
42 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity
43 of Clifton Court Forebay, and grassland restoration, protection and management. Full
44 implementation of Alternative 4 would also include the following biological objectives over the term

of the BDCP that would also benefit special-status reptiles ([BDCP-see Chapter 3, Conservation Strategy, of the Draft BDCP](#)).

- Increase the size and connectivity of the reserve system by acquiring lands adjacent to and between existing conservation lands (Objective L1.6, associated with CM3).
- 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).
- Protect and improve habitat linkages that allow terrestrial covered and other native species to move between protected habitats within and adjacent to the Plan Area (Objective L3.1, associated with CM3, CM8, and CM11).
- Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland (Objective GNC1.2, associated with CM3 and CM8).

As explained below, with the restoration or protection of these amounts of habitat, in addition to implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4-24. Changes in Special-Status Reptile Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Grassland	52291	52291	2491 5189	2491 5189	NA	NA
Total Impacts CM1		52291	52291	2491 5189	2491 5189	NA	NA
CM2–CM18	Grassland	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		52291	52291	2491 5189	2491 5189	0	0

^a See Appendix 12E, [Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS](#), for a 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 Grassland impacts include alkali seasonal wetland complex, grassland, and inland dune scrub natural communities.

^d 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.

^e Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

17

1 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status** 2 **Reptiles**

3 Alternative 4 conservation measures would result in the permanent and temporary loss of ~~301~~
4 ~~442380~~ acres of habitat for special-status reptiles (Table 12-4-24). Water conveyance facilities and
5 transmission line construction, including establishment and use of RTM, borrow, and spoils areas,
6 and geotechnical investigations (CM1) would cause the loss of special-status reptile habitat. In
7 addition, habitat enhancement and management activities (CM11), such as ground disturbance or
8 removal of nonnative vegetation, could result in local adverse habitat effects for special-status
9 reptiles. For purposes of this analysis, the acres of total effects are considered the same for both San
10 Joaquin coachwhip and Blainville's horned lizard, even though there would be slightly more acres of
11 temporary-permanent effect on the ~~Blainville's horned lizard~~San Joaquin coachwhip resulting from
12 CM1 activities in CZ 4.

13 In addition to habitat loss and conversion, construction activities, such as grading, the movement of
14 construction vehicles or heavy equipment, and the installation of water conveyance facilities
15 components and new transmission lines, may result in the direct mortality, injury, or harassment of
16 special-status reptiles, including the potential crushing of individuals and disruption of essential
17 behaviors. Construction of access roads could fragment suitable habitat, impede upland movements
18 in some areas, and increase the risk of road mortality. Construction activities related to conservation
19 components could have similar effects. Each of these individual activities is described below. A
20 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the
21 individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation:* Development of the conveyance facilities would result in the
23 permanent loss of approximately ~~52-291~~ acres of habitat for special-status reptiles in the
24 vicinity of Clifton Court Forebay. Construction-related effects would temporarily disturb ~~249~~
25 ~~15189~~ acres of suitable habitat for special-status reptiles in the study area. There are no
26 occurrences of either species within the construction footprint for CM1.
- 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 special-status reptile habitat. Ground-disturbing activities, such as removal of
31 nonnative vegetation and road and other infrastructure maintenance, are expected to have
32 minor adverse effects on available special-status reptile habitat and are expected to result in
33 overall improvements to and maintenance of species habitat values over the term of the BDCP.
34 These effects cannot be quantified, but are expected to be minimal and would be reduced
35 through implementation of Mitigation Measure BIO-55 *Conduct Preconstruction Surveys for*
36 *Noncovered Special-Status Reptiles and Implement Applicable ~~CM22 Measure~~AMMs.*
- 37 • *Operations and maintenance:* Ongoing facilities operation and maintenance is expected to have
38 little if any adverse effect on special-status reptiles. Postconstruction operation and
39 maintenance of the above-ground water conveyance facilities could result in ongoing but
40 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study
41 area. These effects, however, would be minimized with implementation of Mitigation Measure
42 BIO-55.
- 43 • *Injury and direct mortality:* Construction vehicles may cause injury to or mortality of special-
44 status reptiles. The operation of equipment for land clearing, construction, operation and

1 maintenance, and restoration, enhancement, and management activities could result in injury or
2 mortality. This risk is highest from late fall through early spring, when special-status reptiles are
3 not as active. Increased vehicular traffic associated with BDCP actions could contribute to a
4 higher incidence of road kill. However, conducting construction during the late-spring through
5 early fall periods when feasible and implementation of Mitigation Measure BIO-55 would avoid
6 and minimize injury or mortality of special-status reptiles during construction.

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

10 ***Near-Term Timeframe***

11 Because the water conveyance facilities construction is being evaluated at the project level, the near-
12 term BDCP conservation strategy has been evaluated to determine whether it would provide
13 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
14 construction effects would not be adverse under NEPA. Alternative 4 would remove ~~301-442380~~
15 acres of grassland habitat for special-status reptiles as a result of CM1.

16 The typical NEPA mitigation ratio (2:1 for protection) for this natural community would indicate
17 that ~~602-884760~~ acres should be protected in the near-term to offset CM1 losses.

18 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) ~~and) and~~
19 protection of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are
20 all associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
21 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

22 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55, ~~to~~
23 to avoid and minimize injury or mortality of special-status reptiles during construction, the
24 permanent and temporary loss of special-status reptile habitat and the potential mortality of either
25 species from Alternative 4 would not be an adverse effect.

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

27 Alternative 4 as a whole would result in the permanent loss of ~~301-442380~~ acres of habitat for
28 special-status reptiles over the life of the plan.

29 Effects of water conveyance facilities construction would be offset through the plan's long-term
30 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal
31 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area.
32 Grassland protection would focus in particular on acquiring the largest remaining contiguous
33 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (Objective GNC1.1
34 and GNC1.2). This area connects to more than 620 acres of existing habitat that is protected under
35 the East Contra Costa County HCP/NCCP.

36 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*
37 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable ~~CM22~~*
38 *MeasureAMMs*. The plan as a whole is expected to benefit special-status reptiles that could be
39 present by protecting potential habitat from loss or degradation that otherwise could occur with
40 future changes in existing land use. To the extent that grassland habitat is restored in CZ 8,
41 restoration would replace unsuitable special-status reptile habitat, such as cultivated land, with

1 high-value cover, foraging, and dispersal habitat. The overall effect would be beneficial because
2 Alternative 4 would result in a net increase in acreage of grassland habitat in the study area.

3 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
4 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
5 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
6 construction.

7 **NEPA Effects:** In the near-term and late long-term, the loss of special-status reptile habitat under
8 Alternative 4 would be not be adverse because the BDCP has committed to protecting the acreage
9 required to meet the typical mitigation ratios described above and because of the implementation of
10 Mitigation Measure BIO-55.

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
16 construction impacts would be less than significant under CEQA. Alternative 4 would remove ~~301~~
17 ~~442-380~~ acres of grassland habitat for special-status reptiles as a result of CM1.

18 The typical CEQA mitigation ratio (2:1 for protection) for this natural community would indicate
19 that ~~602-884760~~ acres should be protected in the near-term to offset CM1 losses.

20 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) ~~and~~ and
21 protection of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are
22 all associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
23 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

24 The natural community restoration and protection activities are expected to be concluded during
25 the first 10 years of plan implementation, which would be close enough to the timing of construction
26 impacts to constitute mitigation for CEQA purposes. ~~Considering~~ The restoration and protection
27 activities associated with the BDCP conservation strategy would be sufficient to support the
28 conclusion that the near-term impacts of and the implementation of Mitigation Measure BIO-55, the
29 permanent and temporary loss of special-status reptile habitat and the potential mortality of either
30 species would be a less-than-significant impact under CEQA. A significant impact could occur
31 related to the potential for mortality; however, with implementation of Mitigation Measure BIO-55,
32 the impact related to the potential mortality of either species would also be less than significant
33 because this measure would require that special-status reptiles present in the construction work
34 areas be relocated and that other avoidance and minimization measures be taken to reduce the risk
35 for impacts.

36 **Late Long-Term Timeframe**

37 Alternative 4 as a whole would result in the permanent loss of ~~301-442380~~ acres of habitat for
38 special-status reptiles over the life of the plan.

39 Effects of water conveyance facilities construction would be offset through the plan's long-term
40 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal
41 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area

1 (Objective GNC1.1 and Objective GNC1.2). Grassland protection would focus in particular on
2 acquiring the largest remaining contiguous patches of unprotected grassland habitat, which are
3 located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to more than 620 acres of
4 existing habitat that is protected under the East Contra Costa County HCP/NCCP.

5 Other effects would be reduced through implementation of Mitigation Measure BIO-55. The plan as a
6 whole is expected to benefit special-status reptiles that could be present by protecting potential
7 habitat from loss or degradation that otherwise could occur with future changes in existing land use.
8 To the extent that grassland habitat is restored in CZ 8, restoration would replace unsuitable special-
9 status reptile habitat, such as cultivated land, with high-value cover, foraging, and dispersal habitat.
10 The overall effect would be beneficial because Alternative 4 would result in a net increase in acreage
11 of grassland habitat in the study area.

12 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
13 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
14 CZ 8 would sufficiently offset the ~~adverse effects~~ **significant impacts** resulting from water
15 conveyance facilities construction. Considering the BDCP conservation strategy and the
16 implementation of Mitigation Measure BIO-55, the permanent and temporary loss of special-status
17 reptile habitat and the potential mortality of either species under Alternative 4 would not result in a
18 significant impact under CEQA.

19 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
20 **Status Reptiles and Implement Applicable ~~CM22 Measure~~ **AMMs****

21 DWR will retain a qualified biologist to conduct a habitat assessment in areas that are relatively
22 undisturbed or have a moderate to high potential to support noncovered special-status reptiles
23 (Blainville's horned lizard and San Joaquin coachwhip) in CZ 4, CZ 7, and CZ 8. The qualified
24 biologist will survey for noncovered special-status reptiles in areas of suitable habitat
25 concurrent with the preconstruction surveys for covered species in CZ 4, CZ 7, and CZ 8. If
26 special-status reptiles are detected, the biologist will passively relocate the species out of the
27 work area prior to construction if feasible.

28 In addition, ~~CM22 Avoidance and Minimization Measures, specifically~~ *AMM1 Worker Awareness*
29 *Training, AMM2 Construction Best Management Practices and Monitoring, AMM6 Disposal and*
30 *Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, and AMM10 Restoration of*
31 *Temporarily Affected Natural Communities*, will be implemented for all noncovered special-
32 status reptiles adversely affected by the BDCP to avoid, minimize, or compensate for impacts.

33 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

34 Construction activities associated with water conveyance facilities, conservation components and
35 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
36 conveyance facilities, including the transmission facilities, could result in ongoing periodic
37 postconstruction disturbances and noise with localized effects on special-status reptiles and their
38 habitat over the term of the BDCP.

39 In addition, construction activities could indirectly affect special-status reptiles if construction
40 resulted in the introduction of invasive weeds that create vegetative cover that is too dense for the
41 species to navigate. Construction vehicles and equipment can transport in their tires and various
42 parts under the vehicles invasive weed seeds and vegetative parts from other regions to

1 construction sites, resulting in habitat degradation. These potential effects would be reduced
2 through implementation of AMM10. Water conveyance facilities operations and maintenance
3 activities would include vegetation and weed control, ground squirrel control, canal maintenance,
4 infrastructure and road maintenance, levee maintenance, and maintenance and upgrade of electrical
5 systems. While maintenance activities are not expected to remove special-status reptile habitat,
6 operation of equipment could disturb small areas of vegetation around maintained structures and
7 could result in injury or mortality of individual special-status reptiles, if present.

8 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55, *Conduct Preconstruction Surveys*
9 *for Noncovered Special-Status Reptiles and Implement Applicable ~~CM22-Measure~~AMMs* would avoid
10 the potential for substantial adverse effects on these species, either indirectly or through habitat
11 modifications. The mitigation measure would also avoid and minimize effects that could
12 substantially reduce the number of special-status reptiles, or restrict either species' range.
13 Therefore, with implementation of Mitigation Measure BIO-55, the indirect effects of Alternative 4
14 on special-status reptiles would not be adverse under NEPA.

15 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
16 as construction-related noise and visual disturbances could impact special-status reptiles. In
17 addition, construction activities could indirectly affect special-status reptiles if construction resulted
18 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to
19 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and
20 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but
21 operation of equipment could disturb small areas of vegetation around maintained structures and
22 could result in injury or mortality of individual special-status reptiles, if present, which would be a
23 significant impact.

24 With implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for Noncovered*
25 *Special-Status Reptiles and Implement Applicable ~~CM22-Measure~~AMMs* as part of Alternative 4
26 construction, operation, and maintenance, the BDCP would avoid the potential for significant effects
27 on special-status reptile species, either indirectly or through habitat modifications, and would not
28 result in a substantial reduction in numbers or a restriction in the range of either species. With
29 implementation of Mitigation Measure BIO-55, the indirect effects of BDCP Alternative 4 would have
30 a less-than-significant impact on special-status reptiles.

31 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
32 **Status Reptiles and Implement Applicable ~~CM22-Measure~~AMMs**

33 See description of Mitigation Measure BIO-55 under Impact BIO-55.

1 California Black Rail

2 This section describes the effects of Alternative 4, including water conveyance facilities construction
3 and implementation of other conservation components, on California black rail. The habitat model
4 used to assess effects for the California black rail is based on primary breeding habitat and
5 secondary habitat. Primary (breeding) habitat for this species within the Delta includes all
6 *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches
7 greater than 0.55 acre (essentially instream islands of the San Joaquin River and its tributaries and
8 White Slough Wildlife Area). In Suisun Marsh, primary habitat includes all *Schoenoplectus* and
9 *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that
10 all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed
11 wetlands, in general, are considered secondary habitat with lesser ecological value. Upland
12 transitional zones, ~~that providing provide~~ refugia during high tides, within 150 feet of the tidal
13 wetland edge were also included as secondary habitat. Secondary habitats generally provide only a
14 few ecological functions such as foraging (low marsh and managed wetlands) or extreme high tide
15 refuge (upland transition zones), while primary habitats provide multiple functions, including
16 breeding, effective predator cover, and valuable foraging opportunities.

17 Construction and restoration associated with Alternative 4 conservation measures would result in
18 both temporary and permanent losses of California black rail modeled habitat as indicated in Table
19 12-4-25. Full implementation of Alternative 4 would also include the following conservation actions
20 over the term of the BDCP to benefit the California black rail (~~BDCP-see~~ Chapter 3, Section 3.3,
21 *Biological Goals and Objectives*, ~~of the Draft BDCP~~).

- 22 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at
23 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
24 with CM4).
- 25 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
26 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 27 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
28 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 29 • Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands
30 and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 31 • Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands
32 (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 33 • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
34 natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

35 As explained below, with the restoration and protection of these amounts of habitat, in addition to
36 natural community enhancement and management commitments (including *CM12 Methylmercury*
37 *Management* ~~as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS~~) and
38 implementation of AMM1–AMM7, ~~AMM18–AMM39 California Clapper Rail and California Black Rail,~~
39 and AMM27 *Selenium Management* ~~(as revised in Appendix D, Substantive BDCP Revisions, in this~~
40 ~~RDEIR/SDEIS)~~, impacts on the California black rail would not be adverse for NEPA purposes and
41 would be less than significant for CEQA purposes.

1 **Table 12-4-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	1	1	21	21	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		1	1	21	21	NA	NA
CM2-CM18	Primary	76	84	0	0	0-9	0
	Secondary	986	3,044	0	0	0	6
Total Impacts CM2-CM18		1,062	3,128	0	0	0-9	6
TOTAL IMPACTS		1,063	3,129	21	21	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

4 **Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

5 Alternative 4 conservation measures would result in the combined permanent and temporary loss
6 of up to ~~102-85~~ acres of modeled primary habitat, and up to 3,044 acres of modeled secondary
7 habitat for California black rail (Table 12-4-25). Conservation measures that would result in these
8 losses are conveyance facilities and transmission line construction, and establishment and use of
9 ~~reusable tunnel material borrow and spoil~~ areas (CM1) and tidal habitat restoration (CM4). 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 black rail habitat. Each of these individual activities is
14 described below. A summary statement of the combined NEPA effects, and a CEQA conclusion follow
15 the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation Construction*: Construction of Alternative 4 conveyance
17 facilities would result in the ~~permanent loss of up to 1 acre and the~~ temporary loss of up to ~~48~~
18 ~~21~~ acres of modeled primary California black rail habitat (Table 12-4-25). ~~Activities that would~~
19 ~~impact modeled habitat consists~~ The construction of a temporary transmission line in the
20 central Delta that extends from Bouldin Island to Victoria Island would impact modeled habitat
21 on Mandeville Island, the north end of Bacon Island, and on in-channel islands along the
22 transmission line alignment. Other temporary impacts on modeled habitat would occur from a
23 temporary barge unloading facility and a temporary access road along the north end of Bacon

1 Island, and from a temporary work area on Mandeville Island. Geotechnical exploration could
2 also impact black rail habitat on an in-channel island east of Bacon Island. Up to 1 acre of habitat
3 would be permanently lost from the construction of a permanent transmission line at the
4 northeast corner of Clifton Court Forebay in CZ 8. of tunnel construction, temporary access
5 roads, and construction of transmission lines in the central Delta in CZ 5 (between Bouldin and
6 Venice Islands), CZ 6 (east of Bacon Island), and CZ 8 (at the north end of Coney Island). The
7 CM1 footprint intersects with one California black rail occurrence on Mandeville Island, from the
8 footprint of a the temporary transmission line. The implementation of AMM19-AMM38 California
9 Clapper Rail and California Black Rail (Appendix D, Substantive BDCP Revisions, of this
10 RDEIR/SDEIS BDCP Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP)
11 would minimize the effects of construction on adjacent rails if present in or adjacent to the the
12 work area. Refer to the Terrestrial Biology Map Book in Appendix A of this RDEIR/SDEIS for a
13 detailed views of Alternative 4 construction locations. Impacts from CM1 would occur within the
14 first 10-14 years of Alternative 4 implementation.

- 15 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction or channel modification from fish passage
16 improvements associated with the Yolo Bypass would result in the permanent removal of
17 approximately 5 acres of primary California black rail habitat in CZ 2. There are no occurrences
18 of California black rail that intersect with the CM1 footprint. The loss is expected to occur during
19 the first 10 years of Alternative 4 implementation.
- 20 • *CM4 Tidal Natural Communities Restoration:* California black rail modeled habitat would be
21 affected by tidal marsh restoration. Some California black rail modeled habitat would be
22 permanently lost such that it no longer serves as habitat, while other modeled habitat would
23 change value through conversion from one habitat type to another. Tidal habitat restoration site
24 preparation and inundation would result in the permanent loss of 79 acres of primary habitat
25 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat
26 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the
27 species due to increased water elevations.

28 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh
29 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches
30 and would be replaced by larger continuous areas of tidal wetlands that are expected to support
31 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,
32 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least
33 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-
34 term would benefit California black rail. The primary habitat for the species in the Delta consists
35 of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in
36 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to
37 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects
38 would include an ecotone between wetlands and transitional uplands which would provide
39 upland refugia for the species.

40 The tidal natural communities restoration would be phased through the course of the BDCP
41 restoration program to allow for recovery of some areas before the initiation of restoration
42 actions in other areas. However, California black rails have a greater use of mature tidal marshes
43 and, therefore, it would be years before the newly restored marshes provided suitable habitat
44 for the species. In the long-term, tidal natural communities restoration is expected to have little
45 to no adverse effects on California black rail habitat because the habitat removed would be

1 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a
2 benefit for California black rail.

- 3 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
4 actions contained in *CM11 Natural Communities Enhancement and Management* that are
5 designed to enhance wildlife values in restored and protected tidal wetland habitats may result
6 in localized ground disturbances that could temporarily remove small amounts of California
7 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
8 road and other infrastructure maintenance activities, are expected to have minor adverse effects
9 on available California black rail habitat and are expected to result in overall improvements and
10 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual
11 disturbances during implementation of habitat management actions could also result in
12 temporary disturbances that affect California black rail use of the surrounding habitat. These
13 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below
14 (AMMs are described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the
15 Draft BDCP. AMM38 California Black Rail and an updated version of AMM6 Disposal and Reuse of
16 Spoils, Reusable Tunnel Material and Dredged Material are described in Appendix D, Substantive
17 BDCP Revisions, of this RDEIR/SDEIS). Additional actions under CM11 include the control of
18 nonnative predators to reduce nest predation as needed.
- 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 California black rail use of the surrounding habitat in Suisun and
22 the central Delta. Maintenance activities would include vegetation management, levee and
23 structure repair, and re-grading of roads and permanent work areas. These effects, however,
24 would be reduced by AMMs and conservation actions as described below.
- 25 • Injury and Direct Mortality: Construction vehicle activity may cause injury or mortality to
26 California black rail. If rails are present adjacent to covered activities, the operation of
27 equipment for land clearing, construction, conveyance facilities operation and maintenance, and
28 habitat restoration, enhancement, and management could result in injury or mortality of
29 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to
30 a higher incidence of road kill. However, ~~conducting construction outside of the breeding season~~
31 ~~where feasible (reducing the risk of impacting active nests), construction monitoring, and other~~
32 ~~measures would be implemented to avoid and minimize~~ injury or mortality of the species during
33 ~~construction project activities would be minimized by establishing 500-foot no-disturbance~~
34 ~~buffers around identified territorial calling centers during the breeding season~~, as required by
35 AMM1–AMM7 and AMM19–AMM38 California Clapper Rail and California Black Rail.

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

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 not be adverse under NEPA. With Alternative 4 implementation, there
44 would be a loss of 1,080-084 acres of modeled habitat for California black rail in the study area in

1 the near-term. These effects would result from the construction of the water conveyance facilities
2 (CM1, ~~48-22~~ acres of primary habitat), and implementing other conservation measures (CM2 *Yolo*
3 *Bypass Fisheries Enhancement* and CM4 *Tidal Natural Communities Restoration*—76 acres of primary
4 habitat, 986 acres of secondary habitat).

5 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
6 be affected and that are identified in the biological goals and objectives for California black rail in
7 Chapter 3, *Conservation Strategy*, of the *Draft* BDCP would be 1:1 for restoration/creation of wetland
8 natural communities such as tidal freshwater emergent wetland, tidal brackish emergent wetland,
9 and managed wetland. Using this ratio would indicate that ~~48-22~~ acres of tidal natural communities
10 should be restored/created to compensate for the CM1 losses of California black rail habitat. The
11 near-term effects of other conservation actions would remove 1,062 acres of tidal natural
12 communities, therefore requiring 1,062 acres of tidal natural communities restoration using the
13 same typical NEPA and CEQA ratio (1:1 for restoration).

14 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
15 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
16 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*, of this RDEIR/SDEIS). These
17 conservation actions are all associated with CM4 and would occur in the same timeframe as the
18 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
19 California black rail. The tidal brackish emergent wetland would be restored in CZ 11 among the
20 Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and
21 the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter 3,
22 *Conservation Strategy*, of the Draft BDCP) and the tidal freshwater emergent wetland would be
23 restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal
24 brackish and tidal freshwater emergent wetlands would be restored in a way that creates
25 topographic heterogeneity and in areas that increase connectivity among protected lands
26 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland
27 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of
28 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
29 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
30 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent
31 performance standards for considering the effectiveness of CM4 restoration actions. The acres of
32 restoration and protection contained in the near-term Plan goals and the additional detail in the
33 biological objectives for California black rail satisfy the typical mitigation that would be applied to
34 the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation
35 measures.

36 The Plan also includes commitments to implement the following avoidance and minimization
37 measures that will help to avoid and minimize adverse effects on California black rail: AMM1 Worker
38 Awareness Training, AMM2 Construction Best Management Practices and Monitoring, AMM3
39 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill
40 Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable
41 Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM19-AMM38 California
42 Clapper Rail and California Black Rail. AMM38 California Black Rail requires surveys for California
43 black rail and the implementation of avoidance and minimization measures including the
44 establishment of a 500 foot no disturbance buffer around any identified calling stations. All of these
45 AMMs include elements that would avoid or minimize the risk of affecting individuals and species
46 habitats adjacent to work areas. The AMMs are described in detail in Appendix 3.C, Avoidance and

1 [Minimization Measures, of the Draft BDCP, and AMM38 California Black Rail and an updated version](#)
2 [of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS, BDCP](#)
3 [Appendix 3.C, Avoidance and Minimization Measures.](#)

4 **Late Long-Term Timeframe**

5 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
6 habitat for California black rail. Alternative 4 as a whole would result in the permanent loss of and
7 temporary effects on ~~102-105~~ acres of primary habitat and 3,044 acres of secondary habitat for
8 California black rail during the term of the Plan (1% of the total primary habitat in the study area
9 and 17% of the total secondary habitat in the study area). The locations of these losses are described
10 above in the analyses of individual conservation measures. The Plan includes conservation
11 commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000
12 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres
13 of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These
14 tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
15 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
16 vegetation with dense, tall stands of pickleweed and bulrush cover serving as primary habitat for
17 California black rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of
18 upland refugia for California black rail would be created between the restored tidal freshwater
19 emergent wetlands and transitional uplands to provide cover from predators (Objectives
20 TBEWNC1.4, TFEWNC2.2, and CBR1.1). Portions of the 8,100 acres of managed wetland protected
21 and enhanced in CZ 11 as part of *CM3 Natural Communities Protection and Restoration* would benefit
22 the California black rail through the enhancement of degraded areas (such as areas of bare ground
23 or marsh where the predominant vegetation consists of invasive species such as perennial
24 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
25 (Objective MWNC1.1). Additional pressures on the species such as loss of habitat from invasive
26 species and mortality from nest predators would also be addressed through the BDCP. Perennial
27 pepperweed, which outcompetes suitable nesting habitat for California black rail (such as
28 pickleweed) would be reduced to no more than 10% cover in the tidal brackish emergent wetland
29 natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative predators would be
30 controlled to reduce nest predation if necessary through *CM11 Natural Communities Enhancement*
31 *and Management*.

32 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
33 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
34 above would result in the restoration of 3,579 acres of primary habitat and 12,115 acres of
35 secondary habitat for California black rail and the protection of 275 acres of secondary habitat for
36 the species.

37 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-
38 status species under Alternative 4 would represent an adverse effect in the absence of other
39 conservation actions. However, with habitat protection and restoration associated with CM4, guided
40 by the biological objectives for the species and by *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, AMM7 Barge Operations Plan, and ~~AMM19-AMM38 California Clapper Rail and California~~*

1 *Black Rail*, which would be in place ~~throughout the construction period~~ during all project activities,
2 the effects of Alternative 4 as a whole on California black rail would not be adverse under NEPA.

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. With Alternative 4
9 implementation, there would be a loss of 1,080-084 acres of modeled habitat for California black rail
10 in the study area in the near-term. These effects would result from the construction of the water
11 conveyance facilities (CM1, 18-22 acres of primary habitat), and implementing other conservation
12 measures (*CM2 Yolo Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*–
13 76 acres of primary habitat, 986 acres of secondary habitat).

14 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
15 be affected and that are identified in the biological goals and objectives for California black rail in
16 Chapter 3, *Conservation Strategy*, of the Draft BDCP would be 1:1 for restoration/creation of wetland
17 natural communities such as tidal freshwater emergent wetland, tidal brackish emergent wetland,
18 and managed wetland. Using this ratio would indicate that 18-22 acres of tidal natural communities
19 should be restored/created to mitigate the CM1 losses of California black rail habitat. The near-term
20 effects of other conservation actions would remove 1,062 acres of tidal natural communities,
21 therefore requiring 1,062 acres of tidal natural communities restoration using the same typical
22 NEPA and CEQA ratio (1:1 for restoration).

23 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
24 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
25 the Plan Area (see Table 3-4 in Chapter 3, *Description of Alternatives*, of this RDEIR/SDEIS). These
26 conservation actions are all associated with CM4 and would occur in the same timeframe as the
27 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
28 California black rail. The tidal brackish emergent wetland would be restored in CZ 11 among the
29 Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and
30 the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1) and the tidal freshwater
31 emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
32 TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent wetlands would be restored
33 in a way that creates topographic heterogeneity and in areas that increase connectivity among
34 protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed
35 wetland protected and enhanced in CZ 11 would benefit the California black rail through the
36 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
37 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
38 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). These Plan
39 objectives represent performance standards for considering the effectiveness of CM4 restoration
40 actions.

41 The Plan also includes commitments to implement the following avoidance and minimization
42 measures that will help to avoid and minimize adverse effects on California black rail: *AMM1 Worker*
43 *Awareness Training, AMM2 Construction Best Management Practices and Monitoring, AMM3*
44 *Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*

1 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable*
2 *Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and ~~AMM19-AMM38 California~~*
3 *~~Clapper Rail and California Black Rail~~*. All of these AMMs include elements that would avoid or
4 minimize the risk of affecting individuals and species habitats adjacent to work areas and RTM
5 storage sites. The AMMs are described in detail in Appendix 3.C, Avoidance and Minimization
6 Measures, of the Draft BDCP and AMM38 California Black Rail and an updated version of AMM6
7 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material ~~are described in~~
8 ~~Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS~~ BDCP Appendix 3.C, Avoidance and
9 Minimization Measures.

10 In the absence of other conservation actions, the loss of California black rail habitat and potential
11 direct mortality of this species under Alternative 4 would represent an adverse effect as a result of
12 habitat modification of a special-status species and potential for direct mortality. This impact would
13 be considered significant. However, the BDCP has committed to habitat protection, restoration,
14 management and enhancement activities. As outlined in Draft BDCP Chapter 3, Section 3.4.4,
15 Conservation Measures 27, natural community restoration and protection are planned so that they
16 keep pace with project impacts. and Thus, there would be minimal lag time between impacts and
17 implementation of those measures designed to offset those impacts on natural communities and
18 the species that use them. ~~The natural community restoration and protection activities would be~~
19 ~~concluded in the first 10 years of Plan implementation, which is close enough in time to the~~
20 ~~occurrence of impacts to constitute adequate mitigation for CEQA purposes.~~ In addition, ~~AMM19~~
21 ~~AMM38 California Clapper Rail and California Black Rail~~ and AMM1-AMM7 would avoid and
22 minimize potential impacts on the species from construction-related habitat loss and noise and
23 disturbance. Because the number of acres required to meet the typical mitigation ratio described
24 above would be only ~~3,6081,084~~ acres of restored/created tidal natural communities, the 10,850
25 acres of tidal brackish and tidal freshwater emergent wetland restoration and the 4,100 acres of
26 managed wetland protection and enhancement contained in the near-term Plan goals, and the
27 additional detail in the biological goals and objectives for California black rail, are more than
28 sufficient to support the conclusion that the near-term impacts of habitat loss and direct mortality
29 under Alternative 4 would be less than significant under CEQA. No mitigation would be required.

30 **Late Long-Term Timeframe**

31 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
32 habitat for California black rail. Alternative 4 as a whole would result in the permanent loss of and
33 temporary effects on ~~102-105~~ acres of primary habitat and 3,044 acres of secondary habitat for
34 California black rail during the term of the Plan (1% of the total primary habitat in the study area
35 and 17% of the total secondary habitat in the study area). The locations of these losses are described
36 above in the analyses of individual conservation measures.

37 The Plan includes conservation commitments through *CM4 Tidal Natural Communities Restoration*
38 to restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective
39 TBEWNC1.1) and at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
40 and/or 7 (TFEWNC1.1). These tidal wetlands would be restored as a mosaic of large, interconnected
41 and biologically diverse patches and much of the restored marsh would consist of middle- and high-
42 marsh vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary
43 habitat for California black rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700
44 acres of upland refugia for California black rail would be created between the restored tidal
45 freshwater emergent wetlands and transitional uplands to provide cover from predators (Objectives

1 TBEWNC1.4, TFEWNC2.2, and CBR1.1). Portions of the 8,100 acres of managed wetland protected
2 and enhanced in CZ 11 as part of *CM3 Natural Communities Protection and Restoration* would benefit
3 the California black rail through the enhancement of degraded areas (such as areas of bare ground
4 or marsh where the predominant vegetation consists of invasive species such as perennial
5 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
6 (Objective MWNC1.1). Additional pressures on the species such as loss of habitat from invasive
7 species and mortality from nest predators would also be addressed through the BDCP. Perennial
8 pepperweed, which outcompetes suitable nesting habitat for California black rail (such as
9 pickleweed) would be reduced to no more than 10% cover in the tidal brackish emergent wetland
10 natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators would be
11 controlled to reduce nest predation if necessary through *CM11 Natural Communities Enhancement
12 and Management*.

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, AMM7 Barge Operations Plan, and ~~AMM19-AMM38 California Clapper Rail and California
18 Black Rail~~*. All of these AMMs include elements that would avoid or minimize the risk of affecting
19 individuals and species habitats adjacent to work areas. The AMMs are described in detail in
20 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP and AMM38 California Black
21 Rail and an updated version of AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and
22 Dredged Material is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~BDCP
23 [Appendix 3.C, Avoidance and Minimization Measures](#)~~.

24 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife
25 and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
26 above would result in the restoration of 3,579 acres of primary habitat and 12,115 acres of
27 secondary habitat for California black rail and the protection of 275 acres of secondary habitat for
28 the species.

29 [In the absence of other conservation actions, the loss of California black rail habitat and potential
30 direct mortality of this species under Alternative 4 would represent an adverse effect as a result of
31 habitat modification of a special-status species and potential for direct mortality. This impact would
32 be considered significant. However, the BDCP has committed to habitat protection, restoration,
33 management and enhancement activities.](#) Considering these protection and restoration provisions,
34 which would provide acreages of new or enhanced habitat in amounts greater than necessary to
35 compensate for habitats lost to construction and restoration activities, loss of habitat or direct
36 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
37 through habitat modifications and would not substantially reduce the number or restrict the range
38 of the species. Therefore, the alternative would have a less-than-significant impact on California
39 black rail. [No mitigation would be required.](#)

40 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 41 **Facilities**

42 ~~[New transmission lines would increase the risk for bird-power line strikes, which could result in
43 injury or mortality of California black rail. Black-A variety of rail species](#)~~ are known to suffer
44 mortality from transmission line collision, likely associated with migration and flights between

1 foraging areas (Eddleman ~~et al et al.~~ 1994). Due to their wing shape and body size, rails have low to
 2 moderate flight maneuverability (Bevanger 1998), increasing susceptibility to collision mortality.
 3 However, there are relatively few records of California black rail collisions with overhead wires.
 4 California black rails exhibit daytime site fidelity and a lack of long-distance night migration, two
 5 factors which are associated with low collision risk in avian species (Eddleman et al. 1994).
 6 California black rail movements in the study area are likely short, seasonal, and at low altitudes,
 7 typically less than 16 feet (5 meters) (Eddleman et al, 1994). There are numerous occurrences
 8 within 1 mile of the proposed temporary transmission line which extends north-south between
 9 Bouldin Island and Clifton Court Forebay. However, although ~~While~~ the species may have low to
 10 moderate flight maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting
 11 and foraging, solitary, no flocking, secretive) reduces potential exposure to overhead wires and
 12 vulnerability to collision mortality (~~BDCP see~~ Appendix 5.J, Attachment 5J.C, *Analysis of Potential*
 13 *Bird Collisions at Proposed BDCP Powerlines, of the Draft BDCP*). Marking transmission lines with
 14 flight diverters that make the lines more visible to birds has been shown to dramatically reduce the
 15 incidence of bird mortality (Brown and Drewien 1995). For example, Yee (2008) estimated that
 16 marking devices in the Central Valley could reduce avian mortality by 60%. As described in AMM20
 17 Greater Sandhill Crane, all new project transmission lines would be fitted with flight diverters which
 18 would eliminate any potential for mortality of California black rail individuals from powerline
 19 collisions.

20 Transmission line poles and towers also provide perching substrate for raptors, which are predators
 21 on California black rail. Although there is potential for temporary transmission lines constructed in
 22 the Delta to which could result in increased perching opportunities for raptors and result in
 23 increased predation pressure on local black rails. ~~Little little~~ is currently known about the seasonal
 24 movements of black rails or the potential for increased predation on rails near power poles.
 25 Therefore, because of the limited area over which poles are installed relative to the amount of
 26 California black rail habitat in the Delta, it is assumed that the increase in predation risk on
 27 California black rail from an increase in raptor perching opportunities is negligible. However,
 28 transmission facilities are expected to have few adverse effects on the black rail population.

29 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
 30 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight
 31 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
 32 diverters on all new powerlines ~~and select existing powerlines~~, which would ~~further~~
 33 ~~minimize~~ eliminate or nearly eliminate the risk of ~~bird strike mortality from bird strike~~ for California
 34 black rails ~~in the Delta from the project. The increase in predation risk on California black rail from~~
 35 an increase in raptor perching opportunities is considered negligible because of the limited area
 36 over which poles are installed relative to the amount of California black rail habitat in the Delta.
 37 Therefore, the construction and operation of new transmission lines would not result in an adverse
 38 effect on California black rail. Transmission line structures could increase predation on local black
 39 rails by providing perching structures for raptors. However, these impacts on the California black
 40 rail population are not expected to be adverse.

41 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
 42 significant impact on California black rail because the risk of bird strike is considered to be minimal
 43 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the
 44 commitment to place bird strike diverters on all new ~~powerlines and select existing~~
 45 ~~powerlines~~ transmission lines, which would ~~further minimize~~ eliminate or nearly eliminate the risk
 46 of bird strike for California black rails ~~in the Delta from the project. The increase in predation risk on~~

1 California black rail from an increase in raptor perching opportunities is considered negligible the
2 limited area over which poles are installed relative to the amount of California black rail habitat in
3 the Delta Therefore, the construction and operation of new transmission lines under Alternative 4
4 would result in a less-than-significant impact on California black rail. Transmission line structures
5 could increase predation on local black rails by providing perching structures for raptors. However,
6 these impacts on the California black rail population are expected to be less than significant. No
7 mitigation is required.

8 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

9 **Indirect construction-related effects:** Both primary and secondary habitat for California black rail
10 within the vicinity of proposed construction areas could be indirectly affected by construction
11 activities. Indirect effects associated with construction include noise, dust, and visual disturbance
12 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
13 footprint but within 500 feet from the construction edge. Construction noise above background
14 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
15 activities (~~Draft BDCP~~ Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
16 *Conveyance Facility on Sandhill Crane*, Table 4 in Appendix D, Substantive BDCP Revisions, of this
17 RDEIR/SEIS), although there is no available data to determine the extent to which these noise levels
18 could affect California black rail. The use of mechanical equipment during water conveyance
19 facilities construction could cause the accidental release of petroleum or other contaminants that
20 could affect California black rail in the surrounding habitat. The inadvertent discharge of sediment
21 or excessive dust adjacent to California black rail habitat could also affect the species.

22 If construction occurs during the nesting season, these indirect effects could result in the loss or
23 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment
24 in AMM19-AMM38 California Black Rail (Appendix D, Substantive BDCP Revisions, of this
25 RDEIR/SDEIS as described in ~~see BDCP Appendix 3.C, Avoidance and Minimization Measures, in the~~
26 Draft BDCP) that preconstruction surveys of potential breeding habitat would be conducted within
27 700 feet of project activities, and a 500-foot no-disturbance buffer would be established around any
28 territorial call-centers during the breeding season. In addition, construction would be avoided
29 altogether if breeding territories cannot be accurately delimited.

30 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
31 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
32 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
33 would generally increase as a result of water operations and operations of salinity-control gates to
34 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
35 plant communities tolerant of more brackish environments, which should be beneficial to California
36 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

37 **Methylmercury Exposure:** The modeled primary habitat for California black rail includes tidal
38 brackish emergent wetland and tidal freshwater emergent wetland in Suisun Marsh and the Delta
39 west of Sherman Island, and instream islands and White Slough Wildlife Area in the central Delta.
40 Black rails typically occur in the high marsh zone near the upper limit of tidal flooding in salt and
41 brackish habitats. Low marsh, managed wetlands, and the upland fringe are considered secondary
42 habitat. California black rails are a top predator in the benthic food chain; they nest and forage in
43 dense vegetation and prey on isopods, insects and arthropods from the surface of mud and

1 vegetation They also consume insects and seeds from bulrushes (*Schoenoplectus* spp.) and cattails
2 (*Typha* spp.) (Eddleman et al. 1994).

3 Largemouth bass was used as a surrogate species for analysis (see Appendix D, *Substantive BDCP*
4 *Revisions*, in this RDEIR/SDEIS Appendix D). Results of the quantitative modeling of mercury effects
5 on largemouth bass as a surrogate species would overestimate the effects on Black rail. Organisms
6 feeding within pelagic-based (algal) food webs have been found to have higher concentrations of
7 methylmercury than those in benthic or epibenthic food webs; this has been attributed to food chain
8 length and dietary segregation (Grimaldo et al. 2009). Modeled effects of mercury concentrations
9 from changes in water operations under CM1 on largemouth bass did not differ substantially from
10 existing conditions; therefore, results also indicate that black rail mercury tissue concentrations
11 would not measurably increase as a result of CM1 implementation.

12 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
13 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
14 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
15 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
16 bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). In
17 general, the highest methylation rates are associated with high tidal marshes (primary black rail
18 habitat) that experience intermittent wetting and drying and associated anoxic conditions (Alpers et
19 al. 2008); however, the majority of the overlap between restoration areas and black rail habitat is
20 within Suisun Marsh, where conversion of managed wetlands to tidal wetlands is expected to result
21 in an overall reduction in mercury methylation. Mercury is generally elevated throughout the Delta,
22 and restoration of the lower potential areas in total may result in generalized, very low level
23 increases of mercury. Given that some species have elevated mercury tissue levels pre-BDCP, these
24 low level increases could result in some level of effects. Conservation Measure CM 12, described
25 below, will be implemented to address this risk of low level increases in methylmercury which could
26 add to the current elevated tissue concentrations. Increased methylmercury associated with natural
27 community and floodplain restoration may indirectly affect California black rail, via uptake in lower
28 trophic levels (as described in the BDCP Appendix 5.D, *Contaminants*). In general, the highest
29 methylation rates are associated with high tidal marshes that experience intermittent wetting and
30 drying and associated anoxic conditions (Alpers et al. 2008).

31 The potential mobilization or creation of methylmercury within the study area varies with site-
32 specific conditions and would need to be assessed at the project level. Due to the complex and very
33 site-specific factors that will determine if mercury becomes mobilized into the foodweb, *CM12*
34 *Methylmercury Management*, is included to provide for site-specific evaluation for each restoration
35 project. If a project is identified where there is a high potential for methylmercury production that
36 could not be fully addressed through restoration design and adaptive management, alternate
37 restoration areas would be considered. CM-12 would be implemented in coordination with other
38 similar efforts to address mercury in the Delta, and specifically with the DWR Mercury Monitoring
39 and Analysis Section. This conservation measure would include the following actions.

- 40 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
41 mercury methylation and bioavailability
- 42 ● Define design elements that minimize conditions conducive to generation of methylmercury in
43 restored areas.

- 1 Define adaptive management strategies that can be implemented to monitor and minimize
2 actual postrestoration creation and mobilization of methylmercury.

3 ~~CM12 Methylmercury Management contains provisions for project-specific Mercury Management~~
4 ~~Plans. Along with avoidance and minimization measures and adaptive management and monitoring,~~
5 ~~CM12 is expected to reduce the effects of methylmercury resulting from BDCP natural communities~~
6 ~~and floodplain restoration on California black rail.~~

7 ~~Concentrations of methylmercury known to cause reproductive effects in birds have been found in~~
8 ~~blood and feather samples of San Francisco Bay black rails (Tsao et al. 2009). Because they forage~~
9 ~~directly in contaminated sediments, California black rails may be especially prone to methylmercury~~
10 ~~contamination. Currently, it is unknown how much of the sediment-derived methylmercury enters~~
11 ~~the food chain in Suisun Marsh or what tissue concentrations are actually harmful to the California~~
12 ~~black rail. Although tidal habitat restoration might increase methylation of mercury export to other~~
13 ~~habitats, it is unlikely to increase the exposure of California black rails to methylmercury, as they~~
14 ~~currently reside in tidal marshes in the Delta and the San Francisco Bay, where elevated~~
15 ~~methylmercury levels exist. Sites-specific restoration plans that address the creation and~~
16 ~~mobilization of mercury, as well as monitoring and adaptive management as described in CM12~~
17 ~~would address the uncertainty of methylmercury levels in restored tidal marsh.~~

18 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
19 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
20 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
21 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
22 2009). The effect of selenium toxicity differs widely between species and also between age and sex
23 classes within a species. In addition, the effect of selenium on a species can be confounded by
24 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
25 2009).

26 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
27 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
28 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
29 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
30 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
31 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
32 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
33 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
34 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
35 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic
36 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
37 levels of selenium have a higher risk of selenium toxicity.

38 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
39 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
40 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal
41 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
42 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
43 restoration activities that create newly inundated areas could increase bioavailability of selenium
44 (see [BDCP Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration). Changes in

1 selenium concentrations were analyzed in Chapter 8, *Water Quality*, of the Draft EIR/EIS and it was
2 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
3 in substantial, long-term increases in selenium concentrations in water in the Delta under any
4 alternative. However, it is difficult to determine whether the effects of potential increases in
5 selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)
6 would lead to adverse effects on California black rail.

7 Because of the uncertainty that exists at this programmatic level of review, there could be a
8 substantial effect on California black rail from increases in selenium associated with restoration
9 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
10 *Management* (Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C,
11 Avoidance and Minimization Measures) which would provide specific tidal habitat restoration design
12 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
13 habitats. Furthermore, the effectiveness of selenium management to reduce selenium
14 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
15 part of design and implementation. This avoidance and minimization measure would be
16 implemented as part of the tidal habitat restoration design schedule.

17 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
18 conservation measures could disturb California black rail habitat adjacent to work sites. Potential
19 effects of noise and visual disturbances on California black rail would be minimized with AMM19
20 California Clapper Rail and AMM38 California Black Rail. AMM1–AMM7, including AMM2
21 Construction Best Management Practices and Monitoring, would minimize the likelihood of spills
22 from occurring and ensure that measures were in place to prevent runoff from the construction area
23 and to avoid negative effects of dust on the species.

24 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
25 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
26 expected to establish tidal marsh similar to historic conditions.

27 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
28 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
29 would provide specific tidal habitat restoration design elements to reduce the potential for
30 bioaccumulation of selenium and its bioavailability in tidal habitats.

31 Changes in water operations under CM1 would not be expected to result in increased mercury
32 bioavailability or exposures to Delta foodwebs. Restoration Actions that would create high and low
33 tidal marsh, which is Black Rail habitat, could provide biogeochemical conditions for methylation of
34 mercury in the in the newly inundated soils. There is potential for increased exposure of the
35 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
36 mercury available in the soils and the biogeochemical conditions. However, the planned ROA's do
37 not overlap with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also,
38 the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce
39 the overall production of methylmercury, resulting in a net benefit to species. Implementation of
40 CM12 which contains measures to assess the amount of mercury before project development,
41 followed by appropriate design and adaptation management, would minimize the potential for
42 increased methylmercury exposure, and would result in no adverse effect on the species.

43 ~~The indirect effects associated with noise and visual disturbances, potential spills of hazardous~~
44 ~~material, changes in salinity, and increased exposure to selenium from Alternative 4 implementation~~

1 ~~would not have an adverse effect on California black rail. Tidal habitat restoration is unlikely to have~~
2 ~~a substantial effect on California black rail through increased exposure to methylmercury, as rails~~
3 ~~currently reside in tidal marshes where elevated methylmercury levels exist. However, it is~~
4 ~~unknown what concentrations of methylmercury are harmful to the species and the potential for~~
5 ~~increased exposure varies substantially within the study area. Site-specific restoration plans in~~
6 ~~addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,~~
7 ~~would address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific~~
8 ~~planning phase of marsh restoration would be the appropriate place to assess the potential for risk~~
9 ~~of methylmercury exposure for California black rail, once site specific sampling and other~~
10 ~~information could be developed.~~

11 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other
12 conservation measures could disturb primary and secondary California black rail habitat adjacent to
13 work sites. ~~*AMM19-AMM38 California Clapper Rail and California Black Rail*~~ would avoid and
14 minimize impacts on California black rail from noise and visual disturbance. The use of mechanical
15 equipment during water conveyance facilities construction could cause the accidental release of
16 petroleum or other contaminants that could affect California black rail in the surrounding habitat.
17 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat
18 could also affect the species. These impacts on California black rail would ~~be less than significant~~
19 ~~not be adverse~~ with the incorporation of AMM1–AMM7, including *AMM2 Construction Best Management*
20 *Practices and Monitoring*, into the BDCP.

21 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
22 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
23 changes should have a beneficial impact on California black rail through the establishment of tidal
24 marsh similar to historic conditions.

25 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
26 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
27 would provide specific tidal habitat restoration design elements to reduce the potential for
28 bioaccumulation of selenium and its bioavailability in tidal habitats. With implementation of
29 *AMM27*, potential for increased selenium exposure would result in no adverse effect on the species.

30 Changes in water operations under *CM1* would not be expected to result in increased mercury
31 bioavailability or exposures to Delta foodwebs. Restoration Actions that would create high and low
32 tidal marsh, which is Black Rail habitat, could provide biogeochemical conditions for methylation of
33 mercury in the in the newly inundated soils. There is potential for increased exposure of the
34 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
35 mercury available in the soils and the biogeochemical conditions. However, the planned ROA's do
36 not overlap with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also,
37 the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce
38 the overall production of methylmercury, resulting in a net benefit to species. Implementation of
39 *CM12* which contains measures to assess the amount of mercury before project development,
40 followed by appropriate design and adaptation management, would minimize the potential for
41 increased methylmercury exposure, and would result in no adverse effect on the species.

42 ~~Tidal habitat restoration is unlikely to have a significant impact on California black rail through~~
43 ~~increased exposure to methylmercury, as rails currently reside in tidal marshes where elevated~~
44 ~~methylmercury levels exist. However, it is unknown what concentrations of methylmercury are~~

1 ~~harmful to the species. Site-specific restoration plans in addition to monitoring and adaptive~~
2 ~~management, described in *CM12 Methylmercury Management*, would address the uncertainty of~~
3 ~~methylmercury levels in restored tidal marsh. Tidal habitat restoration could result in increased~~
4 ~~exposure of California black rail to selenium. This effect would be addressed through the~~
5 ~~implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat~~
6 ~~restoration design elements to reduce the potential for bioaccumulation of selenium and its~~
7 ~~bioavailability in tidal habitats. With these measures in place, indirect effects of plan~~
8 ~~implementation would not result in a substantial adverse effect on the species through habitat~~
9 ~~modification or potential mortality of a special-status species. Therefore, the indirect effects of~~
10 Alternative 4 implementation would have a less-than-significant impact on California black rail. No
11 mitigation would be required.

12 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation** 13 **Component Implementation**

14 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
15 temporary barriers to California black rail movements. Grading, filling, contouring and other initial
16 ground-disturbing activities could remove habitat along movement corridors used by individuals
17 and potentially temporarily reduce access to adjacent habitat areas. The temporary adverse effects
18 of fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration
19 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*
20 *Natural Community Restoration* activities. The tidal natural communities restoration would be
21 phased through the course of the BDCP restoration program to allow for recovery of some areas
22 before restoration actions are initiated in other areas. In addition, ~~*AMM19-AMM38 California Clapper*~~
23 ~~*Rail and California Black Rail*~~ would avoid and minimize effects on California black rail.

24 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
25 movement would not represent an adverse effect on California black rail as a result of habitat
26 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would
27 be phased to allow for the recovery of some areas before restoration actions are initiated in other
28 areas. In addition, ~~*AMM19-AMM38 California Clapper Rail and California Black Rail*~~ would avoid and
29 minimize effects on California black rail.

30 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
31 movement would represent a less-than-significant impact on California black rail as a result of
32 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*
33 would be phased to allow for the recovery of some areas before restoration actions are initiated in
34 other areas. In addition, ~~*AMM19-AMM38 California Clapper Rail and California Black Rail*~~ would avoid
35 and minimize impacts on California black rail. No mitigation would be required.

36 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of** 37 **Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the
39 periodic inundation of modeled habitat for California black rail. There are no records for California
40 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the
41 area has been surveyed for California black rails is unknown. Therefore, there is potential for the
42 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration

1 activities are completed. However, periodic inundation would not result in permanent habitat loss
2 and would not prevent use of the bypass by current or future rail populations.

3 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
4 construction of setback levees could result in increased magnitude, frequency and duration of
5 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of
6 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting
7 California black rail are considered to be low, and would not be expected to result in adverse effects
8 on the species.

9 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
10 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California
11 black rail as a result of habitat modification of a special-status species because periodic inundation
12 would not result in permanent habitat loss and would not prevent use of the bypass by current or
13 future rail populations. The risk of changes in inundation frequency and duration through CM2 and
14 CM5 affecting California black rail is considered to be low.

15 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
16 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on
17 California black rail because periodic inundation would not result in permanent habitat loss and
18 would not prevent use of the bypass by current or future rail populations. The risk of changes in
19 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is
20 considered to be low. No mitigation would be required.

21 **California Clapper Rail¹**

22 This section describes the effects of Alternative 4, including water conveyance facilities construction
23 and implementation of other conservation components, on California clapper rail. California clapper
24 rail modeled habitat includes primarily middle marsh habitat with select emergent wetland plant
25 alliances. High marsh is also used if it is of high value, and low marsh provides foraging habitat for
26 the species. California clapper rail secondary habitats generally provide only a few ecological
27 functions such as foraging (low marsh) or high-tide refuge (upland transition zones), while primary
28 habitats provide multiple functions including breeding, effective predator cover, and foraging
29 opportunities. Further details regarding the habitat model, including assumptions on which the
30 model is based, are provided in BDCP Appendix 2.A, Covered Species Accounts, of the Draft BDCP.

31 Construction and restoration associated with Alternative 4 conservation measures would result in
32 both temporary and permanent losses of California clapper rail modeled habitat as indicated in
33 Table 12-4-26. Full implementation of Alternative 4 would also include the following conservation
34 actions over the term of the BDCP to benefit the California clapper rail (BDCP see Chapter 3, Section
35 3.3, Biological Goals and Objectives, of the Draft BDCP).

¹ Based on recent genetic studies by Maley and Brumfield (2013) and Chesser et al. (2014), the "California" (*Rallus longirostris obsoletus*), "Yuma" (*R. l. yumanensis*), and "light-footed" (*R. l. levipes*) subspecies of clapper rail are now recognized by the American Ornithologists' Union (AOU) as a separate species: Ridgway's rail (*Rallus obsoletus*). As such, the taxon formerly known as California clapper rail (*R. l. obsoletus*) is now California Ridgway's rail (*R. o. obsoletus*). For the purposes of this document, the "California clapper rail" common name has been retained due to its use in previous BDCP documents.

- Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated with CM4).

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* [as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS](#)) and implementation of AMM1–AMM7, [AMM18-AMM19 California Clapper Rail and California Black Rail](#), and *AMM27 Selenium Management* [\(as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS\)](#), impacts on the California clapper rail would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4-26. Changes in California Clapper Rail Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	Primary	26	27	0	0	NA	NA
	Secondary	50	50	0	0	NA	NA
Total Impacts CM2–CM18		76	77	0	0		
TOTAL IMPACTS		76	77	0	0		

^a See Appendix 12E, [Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS](#), for a 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

Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper Rail

Alternative 4 conservation measures would result in the total loss or conversion of up to 35 acres of modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary habitat (Table 12-4-26). The conservation measure that would result in these losses is tidal natural communities restoration (CM4). 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 convert
2 approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,
3 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh
4 restoration action would not result in the permanent loss of any California clapper rail habitat in
5 the study area. However, approximately 27 acres of primary habitat would be converted to
6 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or
7 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal
8 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,
9 interconnected, and biologically diverse patches that supported a natural gradient extending
10 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would
11 meet the primary habitat requirements of the California clapper rail, including development of
12 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would
13 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and
14 habitat fragmentation.
- 15 • *CM11 Natural Communities Enhancement and Management*: Because the entire California
16 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement
17 and restoration actions would be expected to benefit the species by creating the potential for
18 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail
19 habitat would be monitored to determine if there is a need for predator control actions. If
20 implemented, nonnative predators would be controlled as needed to reduce nest predation and
21 to help maintain species abundance. A variety of habitat management actions included in *CM11*
22 *Natural Communities Enhancement and Management* that are designed to enhance wildlife
23 values in restored and protected tidal wetland habitats could result in localized ground
24 disturbances that could temporarily remove small amounts of California clapper rail habitat.
25 Ground-disturbing activities, such as removal of nonnative vegetation and road and other
26 infrastructure maintenance activities, would be expected to have minor adverse effects on
27 available California clapper rail habitat. These potential effects are currently not quantifiable,
28 but would be minimized with implementation [of AMM19, California Clapper Rail and California](#)
29 [Black Rail \(BDCP see Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS Appendix 3.C,](#)
30 [Avoidance and Minimization Measures, in the Draft BDCP\).](#)
- 31 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
32 infrastructure could result in ongoing but periodic disturbances that could affect California
33 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include
34 vegetation management, and levee repair. These effects, however, would be reduced by AMMs
35 and conservation actions as described below.
- 36 • *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to
37 California black rail. If rails are present adjacent to covered activities, the operation of
38 equipment for land clearing, and habitat restoration, enhancement, and management could
39 result in injury or mortality of California clapper rail. Operation of construction equipment could
40 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and
41 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the
42 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals
43 are expected to avoid contact with construction equipment. However, nest sites would be
44 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*
45 *Rail and California Black Rail*.

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. There would be no impacts resulting from
9 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76
10 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects
11 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary
12 and 50 acres of secondary habitat).

13 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
14 CM4 and that are identified in the biological goals and objectives for California clapper rail in
15 Chapter 3, *Conservation Strategy*, of the *Draft* BDCP would be 1:1 for restoration/creation of tidal
16 brackish emergent habitat. Using this ratio would indicate that 76 acres of tidal brackish emergent
17 wetland should be restored/created to compensate for the CM4 losses of California clapper rail
18 habitat.

19 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
20 wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*).
21 These conservation actions are associated with CM4 and would occur in the same timeframe as the
22 early restoration losses, thereby avoiding adverse effects on California clapper rail. The tidal
23 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough
24 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton
25 Marsh complex (Objective TBEWNC1.1) and would be restored in a way that creates topographic
26 heterogeneity and in areas that increase connectivity among protected lands (Objectives
27 TBEWNC1.4). These biological goals and objectives would inform the near-term restoration efforts
28 and represent performance standards for considering the effectiveness of restoration actions. These
29 Plan objectives represent performance standards for considering the effectiveness of CM4
30 restoration actions. The acres of restoration contained in the near-term Plan goals satisfy the typical
31 mitigation that would be applied to the near-term effects of tidal restoration.

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, and AMM19 California Clapper Rail and California Black Rail.*
37 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals
38 and species habitats adjacent to work areas. The AMMs are described in detail in *Appendix 3.C,*
39 *Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM6 Disposal*
40 *and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material and AMM19 California Clapper*
41 *Rail* ~~is~~ *are described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS ~~BDCP Appendix~~
42 ~~3.C, Avoidance and Minimization Measures.~~*

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 296 acres of primary and
 3 6,420 acres of secondary habitat for California clapper rail. Alternative 4 as a whole would result in
 4 the permanent loss of and temporary effects on 27 acres of primary habitat and to 50 acres of
 5 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary
 6 habitat in the study area and less than 1% of the total secondary habitat in the study area). The
 7 locations of these losses are described above in the analyses of individual conservation measures.
 8 The Plan includes commitments through *CM4 Tidal Natural Communities Restoration* to restore or
 9 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun
 10 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,
 11 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh
 12 would consist of middle-and high-marsh vegetation, serving as primary habitat for California
 13 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the
 14 species such as loss of habitat from invasive species and mortality from nest predators would also
 15 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail
 16 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish
 17 emergent wetland natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators
 18 would be controlled to reduce nest predation if necessary through *CM11 Natural Communities*
 19 *Enhancement and Management*.

20 The BDCP's beneficial effects analysis (~~BDCP~~see Chapter 5, Section 5.6, *Effects on Covered Wildlife*
 21 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
 22 above, would result in the restoration of 1,500 acres of primary habitat and 4,500 acres of
 23 secondary habitat for California clapper rail.

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*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.
 29 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals
 30 and species habitats adjacent to work areas. The AMMs are described in detail in Appendix 3.C,
 31 Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM6 Disposal
 32 and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material and AMM19 California Clapper
 33 Rail are AMM6 is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS~~BDCP~~
 34 Appendix 3.C, Avoidance and Minimization Measures.

35 **NEPA Effects:** The loss of California clapper rail habitat associated with Alternative 4 would
 36 represent an adverse effect as a result of habitat modification of a special-status species and
 37 potential for direct mortality in the absence of other conservation actions. However, with habitat
 38 protection and restoration associated with CM4, guided by biological goals and objectives and by
 39 *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*,
 40 *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
 41 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable*
 42 *Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper*
 43 *Rail and California Black Rail*, which would be in place during all project activities throughout the
 44 construction period, the effects of Alternative 4 as a whole on clapper rail would not be adverse
 45 under NEPA.

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. There would be no impacts
7 resulting from the construction of the water conveyance facilities (CM1). However, there would be a
8 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from
9 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres
10 of secondary habitat).

11 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
12 CM4 and that are identified in the biological goals and objectives for California clapper rail in
13 Chapter 3, *Conservation Strategy*, of the *Draft* BDCP would be 1:1 for restoration/creation of tidal
14 brackish emergent habitat. Using this ratio would indicate that 76 acres of tidal brackish emergent
15 wetland should be restored/created to mitigate the CM4 losses of California clapper rail habitat.

16 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
17 wetland in the study area. These conservation actions are associated with CM4 and would occur in
18 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California
19 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western
20 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse
21 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that
22 creates topographic heterogeneity and in areas that increase connectivity among protected lands
23 (Objectives TBEWNC1.4).

24 These biological goals and objectives would inform the near-term restoration efforts and represent
25 performance standards for considering the effectiveness of restoration actions. These Plan
26 objectives represent performance standards for considering the effectiveness of CM4 restoration
27 actions.

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 AMM19 California Clapper Rail and California Black Rail.*
33 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals
34 and species habitats adjacent to work areas. The AMMs are described in detail in *Appendix 3.C,*
35 *Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM6 Disposal*
36 *and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material and AMM19 California Clapper*
37 *Rail are AMM6 is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP*
38 *Appendix 3.C, Avoidance and Minimization Measures.*

39 In the absence of other conservation actions, the loss of California clapper rail habitat and potential
40 direct mortality of this species under Alternative 4 would represent an adverse effect as a result of
41 habitat modification of a special-status species and potential for direct mortality. This impact would
42 be considered significant. However, the BDCP has committed to habitat protection, restoration,
43 management and enhancement activities. As outlined in Draft BDCP Chapter 3, Section 3.4.4,

1 ~~Conservation Measures 27, natural community restoration and protection are planned so that they~~
2 ~~keep pace with project impacts. and~~ Thus, there would be minimal lag time between impacts and
3 ~~implementation of those measures designed to offset those impacts on natural communities and~~
4 ~~the species that use them. The natural community restoration and protection activities would be~~
5 ~~concluded in the first 10 years of Plan implementation, which is close enough in time to the~~
6 ~~occurrence of restoration impacts to constitute adequate mitigation for CEQA purposes.~~ In addition,
7 AMM19 California Clapper Rail ~~and California Black Rail~~ and AMM1–AMM7 would avoid and
8 minimize potential impacts on the species from construction-related habitat loss and noise and
9 disturbance. Because the number of acres required to meet the typical mitigation ratio described
10 above would be only 76 acres of restored tidal natural communities, the 2,000 acres of tidal brackish
11 emergent wetland restoration contained in the near-term Plan goals, and the additional detail in the
12 biological objectives for California clapper rail, are more than sufficient to support the conclusion
13 that the near-term impacts of habitat loss and direct mortality under Alternative 4 would be less
14 than significant under CEQA.

15 **Late Long-Term Timeframe**

16 The habitat model indicates that the study area supports approximately 296 acres of primary and
17 6,420 acres of secondary habitat for California clapper rail. Alternative 4 as a whole would result in
18 the permanent loss of and temporary effects on 27 acres of primary habitat and to 8 acres of
19 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary
20 habitat in the study area and less than 1% of the total secondary habitat in the study area). The
21 locations of these losses are described above in the analyses of individual conservation measures.
22 The Plan includes a commitment to restore or create at least 6,000 acres of tidal brackish emergent
23 wetlands for California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal
24 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches
25 and much of the restored marsh would consist of middle-and high-marsh vegetation with dense, tall
26 stands of pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective
27 TBEWNC1.1). Additional pressures on the species such as loss of habitat from invasive species and
28 mortality from nest predators would also be addressed through the BDCP. Perennial pepperweed,
29 which outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more
30 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11
31 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
32 necessary through *CM11 Natural Communities Enhancement and Management*.

33 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
34 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
35 above, would result in the restoration of 1,500 acres of primary habitat and 4,500 acres of
36 secondary habitat for California clapper rail.

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*, and *AMM19 California Clapper Rail ~~and California Black Rail~~*.
42 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals
43 and species habitats adjacent to work areas. The AMMs are described in detail in [Appendix 3.C,](#)
44 [Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM6 Disposal](#)
45 [and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material and AMM19 California Clapper](#)

1 [Rail are AMM6 is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEISBDCP](#)
2 [Appendix 3.C, Avoidance and Minimization Measures.](#)

3 Considering Alternative 4's protection and restoration provisions, which would provide acreages of
4 new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
5 construction and restoration activities, loss of habitat or direct mortality through implementation of
6 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
7 would not substantially reduce the number or restrict the range of the species. Therefore, the
8 alternative would have a less-than-significant impact on California clapper rail.

9 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

10 **Indirect construction-related effects:** California clapper rail habitat within the vicinity of
11 proposed restoration areas could be indirectly affected by construction activities. Indirect effects
12 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
13 contouring, and other ground-disturbing operations outside the project footprint but within 500
14 feet from the construction edge. Construction noise above background noise levels (greater than 50
15 dBA) could extend 500 to 5,250 feet from the edge of construction activities ([Draft BDCP](#) Appendix
16 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
17 *Crane*, Table 4 [in Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS](#)), although there are no
18 available data to determine the extent to which these noise levels could affect California clapper rail.
19 The use of mechanical equipment during construction-related restoration activities could cause the
20 accidental release of petroleum or other contaminants that could affect clapper rail in the
21 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to California
22 clapper rail habitat could also affect the species. If construction occurs during the nesting season,
23 these indirect effects could result in the loss or abandonment of nests, and mortality of any eggs
24 and/or nestlings. However, there is a commitment in *AMM19 California Clapper Rail and California*
25 *Black Rail* (as described in [see Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEISBDCP](#)
26 [Appendix 3.C, Avoidance and Minimization Measures, in the Draft BDCP](#)) that preconstruction
27 surveys of potential breeding habitat would be conducted within 500 feet of project activities, and a
28 500-foot no-disturbance buffer would be established around any territorial call-centers during the
29 breeding season. In addition, construction would be avoided altogether if breeding territories
30 cannot be accurately delimited.

31 Preconstruction surveys conducted under *AMM19 California Clapper Rail and California Black Rail*
32 would ensure construction-related noise and visual disturbances would not have an adverse effect
33 on California clapper rail. AMM1–AMM7, including *AMM2 Construction Best Management Practices*
34 *and Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures
35 were in place to prevent runoff from the construction area and to avoid negative effects of dust on
36 the species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*
37 *and California Black Rail*, there would be no adverse effect on California ~~black clapper~~ rail.

38 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
39 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
40 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
41 would generally increase as a result of water operations and operations of salinity-control gates to
42 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
43 plant communities tolerant of more brackish environments, which would be beneficial to California
44 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

1 **Methylmercury Exposure:** California clapper rail modeled habitat includes primarily middle marsh
2 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
3 of high value, and low marsh provides foraging habitat for the species. California clapper rails are a
4 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
5 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
6 (Eddleman and Conway 1998).

7 Largemouth bass was used as a surrogate species for analysis (see Appendix D, *Substantive BDCP*
8 *Revisions*, in this RDEIR/SDEIS Appendix D). Results of the quantitative modeling of mercury effects
9 on largemouth bass as a surrogate species would overestimate the effects on Black rail. Organisms
10 feeding within pelagic-based (algal) food webs have been found to have higher concentrations of
11 methylmercury than those in benthic or epibenthic food webs; this has been attributed to food chain
12 length and dietary segregation (Grimaldo et al. 2009).

13 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
14 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
15 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
16 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
17 bioavailability of mercury. (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
18 Concentrations of methylmercury known to be toxic to bird embryos have been found in the eggs of
19 San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003). In general, the highest
20 methylation rates are associated with high tidal marshes that experience intermittent wetting and
21 drying and associated anoxic conditions (Alpers et al. 2008). Concentrations of methylmercury
22 known to be toxic to bird embryos have been found in the eggs of San Francisco Bay clapper rails
23 (Schwarzbach and Adelsbach 2003); however, currently, it is unknown how much of the sediment-
24 derived methylmercury enters the food chain in Suisun Marsh or what tissue concentrations are
25 actually harmful to the California clapper rail. However, although tidal habitat restoration might
26 increase methylation of mercury export to other habitats, it is unlikely to significantly increase the
27 exposure of California clapper rails to methylmercury, as they currently reside in tidal marshes
28 where elevated methylmercury levels exist. *CM12 Methylmercury Management* includes project-
29 specific management plans including monitoring and adaptive management to address the
30 uncertainty of methylmercury levels in restored tidal marsh. In general, the highest methylation
31 rates are associated with high tidal marshes that experience intermittent wetting and drying and
32 associated anoxic conditions (Alpers et al. 2008). In Suisun Marsh, the conversion of managed
33 wetlands to tidal wetlands is expected to result in an overall reduction in mercury methylation. Due
34 to the complex and very site-specific factors that will determine if mercury becomes mobilized into
35 the foodweb, *CM12 Methylmercury Management*, is included to provide for site-specific evaluation
36 for each restoration project. If a project is identified where there is a high potential for
37 methylmercury production that could not be fully addressed through restoration design and
38 adaptive management, alternate restoration areas would be considered. *CM-12* would be
39 implemented in coordination with other similar efforts to address mercury in the Delta, and
40 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
41 would include the following actions.

- 42 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
43 mercury methylation and bioavailability
- 44 ● Define design elements that minimize conditions conducive to generation of methylmercury in
45 restored areas.

- 1 [Define adaptive management strategies that can be implemented to monitor and minimize](#)
2 [actual postrestoration creation and mobilization of methylmercury.](#)

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 California clapper rail. Marsh
26 (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, of the Draft BDCP](#) for details of restoration).
30 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, [of the Draft EIR/EIS](#)
31 and it was determined that, relative to Existing Conditions and the No Action Alternative, CM1
32 would not result in substantial, long-term increases in selenium concentrations in water in the Delta
33 under any alternative. However, it is difficult to determine whether the effects of potential increases
34 in selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)
35 would lead to adverse effects on California clapper rail.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a
37 substantial effect on California clapper rail from increases in selenium associated with restoration
38 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
39 *Management* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEISBDCP Appendix 3.C,](#)
40 [Avoidance and Minimization Measures](#)) which would provide specific tidal habitat restoration design
41 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
42 habitats. Furthermore, the effectiveness of selenium management to reduce selenium
43 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
44 part of design and implementation. This avoidance and minimization measure would be
45 implemented as part of the tidal habitat restoration design schedule.

1 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
2 conservation measures could disturb California clapper rail habitat adjacent to work sites. Potential
3 effects of noise and visual disturbances on California clapper rail would be minimized with *AMM19*
4 *California Clapper Rail* ~~and *California Black Rail*~~. *AMM1–AMM7*, including *AMM2 Construction Best*
5 *Management Practices and Monitoring*, would minimize the likelihood of spills from occurring and
6 ensure that measures were in place to prevent runoff from the construction area and to avoid
7 negative effects of dust on the species.

8 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
9 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
10 expected to establish tidal marsh similar to historic conditions.

11 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
12 This effect 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.

15 ~~The indirect effects associated with noise and visual disturbances, potential spills of hazardous~~
16 ~~material, changes in salinity, and increased exposure to selenium from Alternative 4 implementation~~
17 ~~would not have an adverse effect on California clapper rail. Restoration Actions that would create~~
18 ~~tidal marsh could provide biogeochemical conditions for methylation of mercury in the in the newly~~
19 ~~inundated soils. There is potential for increased exposure of the California clapper rail foodweb to~~
20 ~~methylmercury in these areas, with the level of exposure dependent on the amounts of mercury~~
21 ~~available in the soils and the biogeochemical conditions. However, the conversion of managed~~
22 ~~wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the overall production of~~
23 ~~methylmercury, resulting in a net benefit to species. Tidal habitat restoration is unlikely to have an~~
24 ~~adverse effect on California clapper rail through increased exposure to methylmercury, as rails~~
25 ~~currently reside in tidal marshes where elevated methylmercury levels exist. However, it is~~
26 ~~unknown what concentrations of methylmercury are harmful to the species and the potential for~~
27 ~~increased exposure varies substantially within the study area. Implementation of CM12 which~~
28 ~~contains measures to assess the amount of mercury before project development, followed by~~
29 ~~appropriate design and adaptation management, would minimize the potential for increased~~
30 ~~methylmercury exposure, and would result in no adverse effect on the species. Site-specific~~
31 ~~restoration plans in addition to monitoring and adaptive management, described in *CM12*~~
32 ~~*Methylmercury Management*, would address the uncertainty of methylmercury levels in restored~~
33 ~~tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to~~
34 ~~assess the potential for risk of methylmercury exposure for California clapper rail, once site-specific~~
35 ~~sampling and other information could be developed.~~

36 ~~The indirect effects associated with noise and visual disturbances, potential spills of hazardous~~
37 ~~material, changes in salinity, and increased exposure to selenium from Alternative 4 implementation~~
38 ~~would not have an adverse effect on California clapper rail.~~

39 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from ~~the~~
40 ~~CMs~~conservation measures could disturb California clapper rail habitat adjacent to work sites.
41 *AMM19 California Clapper Rail* ~~and *California Black Rail*~~ would avoid and minimize impacts on
42 California clapper rail from noise and visual disturbance. The use of mechanical equipment during
43 restoration activities ~~water conveyance facilities construction~~ could cause the accidental release of
44 petroleum or other contaminants ~~that could affect California clapper rail in the surrounding habitat.~~

1 ~~Theor the~~ inadvertent discharge of sediment or excessive dust adjacent to California clapper rail
2 habitat ~~which could adversely could also~~ affect the species. These impacts on California clapper rail
3 would ~~be less than significantnot be adverse~~ with the incorporation of AMM1–AMM7 into the BDCP.

4 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
5 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
6 changes should have a beneficial impact on California clapper rail through the establishment of tidal
7 marsh similar to historic conditions.

8 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
9 This effect would be addressed through the implementation of AMM27 Selenium Management which
10 would provide specific tidal habitat restoration design elements to reduce the potential for
11 bioaccumulation of selenium and its bioavailability in tidal habitats.

12 Restoration Actions that would create tidal marsh could provide biogeochemical conditions for
13 methylation of mercury in the in the newly inundated soils. There is potential for increased
14 exposure of the California clapper rail foodweb to methylmercury in these areas, with the level of
15 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
16 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
17 be expected to reduce the overall production of methylmercury, resulting in a net benefit to species.
18 Implementation of CM12 which contains measures to assess the amount of mercury before project
19 development, followed by appropriate design and adaptation management, would minimize the
20 potential for increased methylmercury exposure, and would result in no adverse effect on the
21 species. Although tidal habitat restoration might increase methylation of mercury export to other
22 habitats, it is unlikely to significantly increase the exposure of California clapper rails to
23 methylmercury, as they currently reside in tidal marshes in the San Francisco Bay, where elevated
24 methylmercury levels exist. It is unknown what concentrations of methylmercury are harmful to the
25 species. CM12 Methylmercury Management includes project-specific management plans including
26 monitoring and adaptive management to address the uncertainty of methylmercury levels in
27 restored tidal marsh. Tidal habitat restoration could result in increased exposure of California
28 clapper rail to selenium. This effect would be addressed through the implementation of AMM27
29 Selenium Management which would provide specific tidal habitat restoration design elements to
30 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

31 With these measures in place, indirect effects of plan implementation would not result in a
32 substantial adverse effect on the species through habitat modification or potential mortality of a
33 special-status species. Therefore, the indirect effects of Alternative 4 implementation would have a
34 less-than-significant impact on California clapper rail.

35 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission** 36 **Facilities**

37 Isolated patches of suitable California clapper rail habitat may occur in the study area as far east as
38 (but not including) Sherman Island. Home range and territory of the California clapper rail is not
39 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to
40 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with
41 the proposed lines (BDCP Attachment 5).C, *Analysis of Potential Bird Collisions at Proposed BDCP*
42 *Transmission Lines*). The location of the current population and suitable habitat for the species make
43 collision with the proposed transmission lines highly unlikely.

1 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
2 effect on California clapper rail because the location of the current population and suitable habitat
3 for the species would make collision with the proposed transmission lines highly unlikely.

4 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
5 significant impact on California clapper rail because the location of the current population and
6 suitable habitat for the species would make collision with the proposed transmission lines highly
7 unlikely.

8 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation** 9 **Component Implementation**

10 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
11 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other
12 initial ground-disturbing activities could remove habitat along movement corridors used by
13 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse
14 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or
15 restoration activities resulting in barriers to movement would be minimized through sequencing of
16 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities
17 restoration would be phased through the course of the BDCP restoration program to allow for
18 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*
19 *California Clapper Rail and California Black Rail* would avoid and minimize effects on California
20 clapper rail.

21 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
22 movement would not represent an adverse effect on California clapper rail as a result of special-
23 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be
24 phased to allow for the recovery of some areas before restoration actions are initiated in other
25 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and
26 minimize effects on California clapper rail.

27 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
28 movement would represent a less-than-significant impact on California clapper rail as a result of
29 habitat modification of a special status species because *CM4 Tidal Natural Communities Restoration*
30 would be phased to allow for the recovery of some areas before initiating restoration actions in
31 other areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would
32 avoid and minimize effects on California clapper rail.

33 **California Least Tern**

34 This section describes the effects of Alternative 4, including water conveyance facilities construction
35 and implementation of other conservation components, on California least tern. California least tern
36 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the
37 study area. Breeding habitat is not included in the model because most of the natural shoreline in
38 the study area that historically provided nesting sites has been modified or removed.

39 Construction and restoration associated with Alternative 4 conservation measures would result in
40 both temporary and permanent losses of California least tern modeled foraging habitat as indicated
41 in Table 12-4-27. Full implementation of Alternative 4 would also include the following

1 conservation actions over the term of the BDCP to benefit California least tern ([BDCP-see Chapter 3,](#)
2 Section 3.3, *Biological Goals and Objectives*, [of the Draft BDCP](#)).

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

10 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of
11 Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial
12 waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy
13 or gravelly substrates with sparse vegetation).

14 As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat,
15 in addition to natural community enhancement and management commitments (including CM12
16 *Methylmercury Management* [as revised in Appendix D, Substantive BDCP Revisions, in this](#)
17 [RDEIR/SDEIS](#)) and implementation of AMM1–AMM7, *AMM27 Selenium Management* ([as revised in](#)
18 [Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS](#)), and mitigation to avoid impacts on
19 terns should they nest in the study area, impacts on the California least tern would not be adverse
20 for NEPA purposes and would be less than significant for CEQA purposes.

21 **Table 12-4-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 4**
22 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	207	207	2,098	2,098	NA	NA
Total Impacts CM1		207	207	2,098	2,098	NA	NA
CM2–CM18	Foraging	38	46	11	16	NA	NA
Total Impacts CM2–CM18		38	46	11	16	NA	NA
TOTAL IMPACTS		245	253	2,109	2,114	NA	NA

^a See Appendix 12E, [Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS](#), for a 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

23

Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 2,341-367 acres of modeled foraging habitat for California least tern (Table 12-4-27). The conservation measures that would result in these losses are construction of water conveyance facilities and operation (CM1), Yolo Bypass Fisheries Enhancement (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 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 CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities Construction and Operation:* Construction of Alternative 4 conveyance facilities would result in the combined permanent and temporary loss of up to 2,279-305 acres of modeled California least tern aquatic foraging habitat (Table 12-4-27). Of these acres, 178 207 acres would be a permanent loss the majority of which would occur where Intakes 2, 3 and 5 encroach on the Sacramento River’s east bank between Clarksburg and Courtland. Permanent losses would also occur where new control structures would be built into the California Aqueduct and the Delta Mendota Canal adjacent to Clifton Court Forebay. The temporary effects on tidal perennial aquatic habitats would occur at numerous locations, with the largest affect occurring at Clifton Court Forebay, where the entire forebay would be dredged to provide additional storage capacity. Other temporary effects would occur in the Sacramento River at Intakes 2, 3, and 5, and at temporary barge unloading facilities established at three locations along the tunnel route. The CM1 footprint does not overlap with any California least tern occurrences. Refer to the Terrestrial Biology Map-Book in Appendix A of this RDEIR/SDEIS for a detailed views of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-14 years of Alternative 4 implementation.
- *CM2 Yolo Bypass Fisheries Enhancement:* Construction of Yolo Bypass fisheries enhancement (CM2) would result in the permanent loss of 8 acres and the temporary loss of 11 acres of modeled aquatic foraging habitat for California least tern in CZ 2. Activities from Fremont and Sacramento Weir improvements, Putah Creek realignment, and Lisbon Weir modification could involve excavation and grading in tidal perennial aquatic areas to improve passage of fish through the bypasses. The loss is expected to occur during the first 10 years of Alternative 4 implementation.
- *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration actions would result in the permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration, consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment, of the Draft BDCP*). This restoration is consistent with BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to substantially increase the primary productivity of fish, increasing the prey base for California least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years of BDCP implementation, which would coincide with the timeframe of water conveyance facilities construction. The remaining restoration would be phased over the following 30 years. Some of the restoration would occur in the lower Yolo Bypass, but

1 restoration would also be spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne
2 and West Delta ROAs.

- 3 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
4 seasonally inundated floodplain would result in the permanent loss of 2 acres and the
5 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This
6 activity is scheduled to start following construction of water conveyance facilities, which is
7 expected to take 10 years. Specific locations for the floodplain restoration have not been
8 identified, but it is expected that much of the activity would occur in the south Delta along the
9 major rivers.
- 10 ● *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances
11 during implementation of habitat management actions could result in temporary disturbances
12 that affect California least tern use of the surrounding habitat. These effects cannot be
13 quantified, but are expected to be minimal because few management activities would be
14 implemented in aquatic habitat and because terns are not expected to nest on protected lands.
15 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting
16 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and
17 injury mortality and noise and visual disturbance of nesting terns would be avoided and
18 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies
19 Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.
- 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 postconstruction disturbances, localized impacts on California least tern foraging habitat, and
23 temporary noise and disturbances over the term of the BDCP. Maintenance activities would
24 include vegetation management, levee and structure repair, and re-grading of roads and
25 permanent work areas which could be adjacent to California least tern foraging habitat. These
26 effects, however, would be reduced by AMMs described-listed below.
- 27 ● Injury and Direct Mortality: California least terns currently nest in the vicinity of potential
28 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies
29 could establish if suitable nesting habitat is created during restoration activities (e.g., placement
30 of unvegetated fill to raise surface elevations prior to breaching levees during restoration
31 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment
32 for land clearing, construction, conveyance facilities operation and maintenance, and habitat
33 restoration, enhancement, and management could result in injury or mortality of California least
34 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-
35 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the
36 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals
37 would be expected to avoid contact with construction equipment. However, injury or mortality
38 would be avoided through planning and preconstruction surveys to identify nesting colonies,
39 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot
40 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be
41 Avoided and Indirect Effects on Colonies Will Be Minimized*.

42 The following paragraph summarizes the combined effects discussed above and describes 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 and/or restoration in an appropriate timeframe to ensure that
5 the effects of construction would not be adverse under NEPA. With Alternative 4 implementation,
6 there would be a loss of 2,328-354 acres of modeled foraging habitat for California least tern in the
7 study area in the near-term. These effects would result from the construction of the water
8 conveyance facilities (CM1, 2,279-305 acres), and implementing other conservation measures (Yolo
9 Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled
10 foraging habitat impacts would occur in tidal perennial aquatic natural communities.

11 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
12 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
13 indicate that 2,279-305 acres of the tidal perennial aquatic natural community should be
14 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The
15 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic
16 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration
17 using the same typical NEPA and CEQA ratio (1:1 for restoration).

18 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
19 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3,
20 *Description of Alternatives, of this RDEIR/SDEIS*). This conservation action would result in the
21 creation of approximately 3,400 acres of high quality tidal perennial aquatic natural community,
22 based on modeling conducted by ESAPWA (refer to Table 5 in *BDCP Appendix 3.B, BDCP Tidal*
23 *Habitat Evolution Assessment, Detailed Accounting of Direct Effects of Alternatives on Natural*
24 *Communities and Covered Species, of this RDEIR/SDEIS*). Tidal perennial aquatic restoration would
25 occur in the same timeframe as the construction and early restoration losses, thereby avoiding
26 adverse effects on California least tern from loss of foraging habitat.

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 at or adjacent to work areas and
33 storage sites. The AMMs are described in detail in *Appendix 3.C, Avoidance and Minimization*
34 *Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,*
35 *Substantive BDCP Revisions, of this RDEIR/SDEIS* *BDCP Appendix 3.C, Avoidance and Minimization*
36 *Measures*.

37 The California least tern is not a species that is covered under the BDCP. Although nesting by
38 California least tern is not expected to occur, restoration sites could attract individuals wherever
39 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly
40 substrates with sparse vegetation). If nesting were to occur, construction activities could have an
41 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*
42 *Colonies Shall be Avoided and Indirect Effects on Colonies Will be Minimized*, would be available to
43 address this adverse effect on nesting California least terns.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
 3 habitat for California least tern. Alternative 4 as a whole would result in the permanent loss of and
 4 temporary effects on 2,341-367 acres of foraging habitat during the term of the Plan (3% of the total
 5 habitat in the study area). The locations of these losses are described above in the analyses of
 6 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
 7 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal
 8 perennial aquatic natural community would be restored (estimated from Table 5 in *BDCP* Appendix
 9 3.B, *BDCP Tidal Habitat Evolution Assessment, of the Draft BDCP*). The restoration would occur over a
 10 wide region of the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache
 11 Creek, and South Delta ROAs (see Figure 12-1).

12 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality
 13 associated with Alternative 4 would represent an adverse effect in the absence of other conservation
 14 actions. Although nesting by California least tern is not expected to occur in the study area,
 15 restoration sites could attract individuals wherever disturbed or artificial sites mimic habitat
 16 conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting
 17 were to occur, construction activities could have an adverse effect on California least tern. Mitigation
 18 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*
 19 *Colonies will be Minimized*, would be available to address this effect on nesting California least terns.
 20 With habitat restoration associated with CM4, guided by *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*, which would be in place during all project
 25 activities throughout the construction period, the effects of Alternative 4 as a whole on California
 26 least tern would not be adverse.

27 **CEQA Conclusion:**

28 **Near-Term Timeframe**

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 30 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 31 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 32 the effects of construction would be less than significant under CEQA. With Alternative 4
 33 implementation, there would be a loss of 2,328-354 acres of modeled foraging habitat for California
 34 least tern in the study area in the near-term. These effects would result from the construction of the
 35 water conveyance facilities (CM1, 2,279-305 acres), and implementing other conservation measures
 36 (Yolo Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All
 37 modeled foraging habitat impacts would occur in tidal perennial aquatic natural communities.

38 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
 39 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
 40 indicate that 2,279-305 acres of the tidal perennial aquatic natural community should be
 41 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The
 42 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic
 43 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration
 44 using the same typical NEPA and CEQA ratio (1:1 for restoration).

1 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
2 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (see Table 3-4 in Chapter 3,
3 *Description of Alternatives, of this RDEIR/SDEIS*). Modeling conducted by ESA PWA indicates that
4 this conservation action would result in the creation of approximately 3,400 acres of high-value tidal
5 perennial aquatic natural community (refer to Table 5 in ~~BDCP~~ Appendix 3.B, *BDCP Tidal Habitat*
6 *Evolution Assessment, of the Draft BDCP*). Tidal perennial aquatic restoration would occur in the
7 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects
8 on California least tern.

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 Spoils, Reusable Tunnel Material, and Dredged Material Disposal Plan,*
13 *and AMM7 Barge Operations Plan.* All of these AMMs include elements that would avoid or minimize
14 the risk of affecting individuals and species habitats at or adjacent to work areas and storage sites.
15 The AMMs are described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the
16 Draft BDCP, and an updated version of AMM6 is described in Appendix D, Substantive BDCP
17 Revisions, of this RDEIR/SDEIS~~BDCP Appendix 3.C, Avoidance and Minimization Measures.~~

18 In the absence of other conservation measures, the effects on California least tern habitat from
19 Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status
20 species and potential for direct mortality. Although nesting by California least tern is not expected to
21 occur, restoration sites could attract individuals wherever disturbed or artificial sites mimic habitat
22 conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting
23 were to occur, construction activities could have a significant impact on California least tern.
24 Implementation of Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall be*
25 *Avoided and Indirect Effects on Colonies Will be Minimized*, would reduce the impact on nesting
26 California least terns to a less-than-significant level.

27 As outlined in Draft BDCP Chapter 3, Section 3.4.4, Conservation Measures-27, natural community
28 restoration and protection are planned so that they keep pace with project impacts. and Thus, there
29 would be minimal lag time between impacts and implementation of those measures designed to
30 offset those impacts to on natural communities and the species that use them. The natural
31 community restoration and protection activities would be concluded in the first 10 years of Plan
32 implementation, which is close enough in time to the occurrence of impacts to constitute adequate
33 mitigation for CEQA purposes. In addition, AMM1–AMM7 and Mitigation Measure BIO-66, *California*
34 *Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would
35 avoid and minimize potential impacts on the species from construction-related habitat loss and
36 noise and disturbance. Because the number of acres required to meet the typical mitigation ratio
37 described above would be only 2,309 acres of restored tidal perennial aquatic habitat, the 3,400
38 acres of tidal perennial aquatic restoration estimated in the near-term, are more than sufficient to
39 support the conclusion that the near-term impacts of habitat loss and direct mortality under
40 Alternative 4 would be less than significant under CEQA. No mitigation would be required.

41 **Late Long-Term Timeframe**

42 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
43 habitat for California least tern. Alternative 4 as a whole would result in the permanent loss of and
44 temporary effects on 2,~~341-367~~ acres of foraging habitat during the term of the Plan (3% of the total

1 habitat in the study area). The locations of these losses are described above in the analyses of
2 individual conservation measures. The Plan includes conservation commitments through CM4 Tidal
3 Natural Communities Restoration to restore an estimated 27,000 acres of high-value tidal perennial
4 aquatic natural community (estimated from Table 5 in ~~BDCP~~-Appendix 3.B, *BDCP Tidal Habitat*
5 *Evolution Assessment, of the Draft BDCP*). The restoration would occur over a wide region of the
6 study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta
7 ROAs (see Figure 12-1).

8 In the absence of other conservation actions, the loss of California least tern foraging habitat and
9 potential direct mortality associated with Alternative 4 would represent an adverse effect as a result
10 of habitat modification of a special-status species and potential for direct mortality. Although
11 nesting by California least tern is not expected to occur, restoration sites could attract individuals
12 wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or
13 gravelly substrates with sparse vegetation). If nesting were to occur, construction activities could
14 have a significant impact on California least tern. The loss of California least tern foraging habitat
15 and potential direct mortality associated with Alternative 4 would represent a significant impact in
16 the absence of other conservation actions.

17 ~~The loss of California least tern foraging habitat and potential direct mortality associated with~~
18 ~~Alternative 4 would represent a significant impact in the absence of other conservation actions.~~
19 However, with habitat restoration associated with CM4, guided by *AMM1 Worker Awareness*
20 *Training, AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater*
21 *Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention,*
22 *Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*
23 *Material, and Dredged Material, AMM7 Barge Operations Plan, and implementation of Mitigation*
24 *Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
25 *Colonies Will Be Minimized, the loss of habitat or mortality under this alternative would have a less-*
26 *than-significant impact on California least tern. No mitigation would be required.*

27 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and** 28 **Indirect Effects on Colonies Will Be Minimized**

29 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging
30 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist
31 with experience observing the species and its nests conducts at least three preconstruction
32 surveys for this species during the nesting season. DWR will design projects to avoid the loss of
33 California least tern nesting colonies. No construction will take place within 500 feet California
34 least tern nests during the nesting season (April 15 to August 15 or as determined through
35 surveys). Only inspection, maintenance, research, or monitoring activities may be performed
36 during the least tern breeding season in areas within or adjacent to least tern breeding habitat
37 with USFWS and CDFW approval under the supervision of a qualified biologist.

38 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

39 **Indirect construction- and operation-related effects:** Indirect effects associated with
40 construction that could affect California least tern include noise, dust, and visual disturbance caused
41 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint
42 but within 500 feet from the construction edge. Construction noise above background noise levels
43 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (Draft

1 ~~BDCP~~ Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
 2 *Facility on Sandhill Crane*, Table 4 ~~in Appendix D, *Substantive BDCP Revisions, of this RDEIR/SEIS*~~,
 3 although there are no available data to determine the extent to which these noise levels could affect
 4 California least tern. 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 least tern or their prey species in the surrounding habitat. The inadvertent discharge of
 7 sediment or excessive dust adjacent to foraging habitat could also affect the species. Noise and visual
 8 disturbance is not expected to have an adverse effect on California least tern foraging behavior. As
 9 described in Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and*
 10 *Indirect Effects on Colonies Will Be Minimized*, if least tern nests were found during planning or
 11 preconstruction surveys, no construction would take place within 500 feet of active nests. In
 12 addition, AMM1–AMM7, including construction best management practices, would minimize the
 13 likelihood of spills or excessive dust being created during construction. Should a spill occur,
 14 implementation of these AMMs would greatly reduce the likelihood of individuals being affected.

15 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation
 16 of mercury in ~~avian species including~~ the California least tern.

17 The operational impacts of new flows under CM1 were analyzed using a DSM-2 based model to
 18 assess potential effects on mercury concentration and bioavailability. ~~Largemouth bass were used as~~
 19 ~~a surrogate species for this analysis and results would be expected to be similar or lower for the~~
 20 ~~California least tern. Subsequently, a regression model was used to estimate fish-tissue~~
 21 ~~concentrations under these future operational conditions (evaluated starting operations or ESO).~~
 22 Results indicated that changes in total mercury levels in water and ~~large mouth bass fish~~ tissues ~~due~~
 23 ~~to ESO~~ were insignificant (see ~~Draft BDCP Appendix 5.D, *Contaminants*, Tables 5D.4-3, 5D.4-4, and~~
 24 ~~5D.4-5~~).

25 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
 26 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
 27 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
 28 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
 29 bioavailability of mercury ~~(see BDCP Chapter 3, *Conservation Strategy, for details of restoration*).~~
 30 Increased methylmercury associated with natural community and floodplain restoration may
 31 indirectly affect California least tern, via uptake ~~through consumption of prey in lower trophic levels~~
 32 ~~(as described in the BDCP, Appendix 5.D, *Contaminants, of the Draft BDCP*). In general, the highest~~
 33 ~~methylation rates are associated with high tidal marshes that experience intermittent wetting and~~
 34 ~~drying and associated anoxic conditions (Alpers et al. 2008). The potential mobilization or creation~~
 35 ~~of methylmercury within the study area varies with site-specific conditions and would need to be~~
 36 ~~assessed at the project level.~~

37 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting
 38 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were
 39 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from
 40 their fish prey. The very highest concentrations were found in Caspian and Forster’s terns, especially
 41 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from
 42 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern
 43 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample
 44 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in
 45 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are

1 representative of the population in the San Francisco Bay, they would not be expected to result in
2 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern
3 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

4 Mercury is generally elevated throughout the Delta, and restoration of the lower potential areas in
5 total may result in generalized, very low level increases of mercury. Given that some species have
6 elevated mercury tissue levels pre-BDCP, these low level increases could result in some level of
7 effects. CM-12, described below, will be implemented to address this risk of low level increases in
8 methylmercury which could add to the current elevated tissue concentrations.

- 9 • Assess pre-restoration conditions to determine the risk that the project could result in increased
10 mercury methylation and bioavailability
- 11 • Define design elements that minimize conditions conducive to generation of methylmercury in
12 restored areas.
- 13 • Define adaptive management strategies that can be implemented to monitor and minimize
14 actual postrestoration creation and mobilization of methylmercury.

15 ~~CM12 Methylmercury Management includes provisions for project-specific Mercury Management~~
16 ~~Plans. Site-specific restoration plans that address the creation and mobilization of mercury, as well~~
17 ~~as monitoring and adaptive management as described in CM12 would be available to address the~~
18 ~~uncertainty of methylmercury levels in restored tidal marsh and potential impacts on California~~
19 ~~least tern.~~

20 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low
21 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf
22 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also
23 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The
24 effect of selenium toxicity differs widely between species and also between age and sex classes
25 within a species. In addition, the effect of selenium on a species can be confounded by interactions
26 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

27 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
28 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
29 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
30 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
31 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
32 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
33 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
34 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
35 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
36 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic
37 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
38 levels of selenium have a higher risk of selenium toxicity.

39 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
40 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
41 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal
42 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
43 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP

1 restoration activities that create newly inundated areas could increase bioavailability of selenium
2 (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration). Changes in
3 selenium concentrations were analyzed in Chapter 8, *Water Quality, of the Draft EIR/EIS* and it was
4 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
5 in substantial, long-term increases in selenium concentrations in water in the Delta under any
6 alternative. However, it is difficult to determine whether the effects of potential increases in
7 selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)
8 would lead to adverse effects on California least tern.

9 Because of the uncertainty that exists at this programmatic level of review, there could be a
10 substantial effect on California least tern from increases in selenium associated with restoration
11 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
12 *Management* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEISBDCP Appendix 3.C,](#)
13 [Avoidance and Minimization Measures](#)) which would provide specific tidal habitat restoration design
14 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
15 habitats. Furthermore, the effectiveness of selenium management to reduce selenium
16 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
17 part of design and implementation. This avoidance and minimization measure would be
18 implemented as part of the tidal habitat restoration design schedule.

19 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from
20 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
21 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
22 *Colonies Will Be Minimized*, would be available to address this **potential** adverse effect. AMM1–
23 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
24 the likelihood of spills from occurring and ensure that measures were in place to prevent runoff
25 from the construction area and to avoid negative effects of dust on the species.

26 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
27 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
28 would provide specific tidal habitat restoration design elements to reduce the potential for
29 bioaccumulation of selenium and its bioavailability in tidal habitats. ~~The indirect effects associated~~
30 ~~with noise and visual disturbances, potential spills of hazardous material, and increased exposure to~~
31 ~~selenium from Alternative 4 implementation would not have an adverse effect on California least~~
32 ~~tern.~~

33 ~~Changes in water operations under CM1 would not be expected to result in increased mercury~~
34 ~~bioavailability or exposures to Delta foodwebs.~~ Tidal habitat restoration could result in increased
35 exposure of California least tern to methylmercury. ~~There is potential for increased exposure of the~~
36 ~~foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of~~
37 ~~mercury available in the soils and the biogeochemical conditions.~~ However, it is unknown what
38 concentrations of methylmercury are harmful to the species, and the potential for increased
39 exposure varies substantially within the study area. ~~Implementation of CM12 which contains~~
40 ~~measures to assess the amount of mercury before project development, followed by appropriate~~
41 ~~design and adaptation management, would minimize the potential for increased methylmercury~~
42 ~~exposure, and would result in no adverse effect on the species.~~ ~~Site-specific restoration plans that~~
43 ~~address the creation and mobilization of mercury, as well as monitoring and adaptive management~~
44 ~~as described in CM12 Methylmercury Management, would be available to address the uncertainty of~~
45 ~~methylmercury levels in restored tidal marsh and potential impacts on California least tern. 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 California least tern, once site specific sampling~~
3 ~~and other information could be developed.~~

4 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities
5 from the CMs could disturb California least tern foraging habitat adjacent to work sites. 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 impacts on potential nesting California least~~
8 ~~terns from noise and visual disturbance~~this potential adverse effect.

9 AMM1–AMM7, including AMM2 Construction Best Management Practices and Monitoring, would
10 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
11 runoff from the construction area and to avoid negative effects of dust on the species. The use of
12 mechanical equipment during water conveyance facilities construction could cause the accidental
13 release of petroleum or other contaminants that could affect California least tern if present in the
14 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to California
15 least tern habitat could also affect the species. These impacts on California least tern would be less
16 than significant with the incorporation of AMM1–AMM7 into the BDCP.

17 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
18 effect would be addressed through the implementation of AMM27 Selenium Management, which
19 would provide specific tidal habitat restoration design elements to reduce the potential for
20 bioaccumulation of selenium and its bioavailability in tidal habitats.

21 Changes in water operations under CM1 would not be expected to result in increased mercury
22 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
23 exposure of California least tern to methylmercury. There is potential for increased exposure of the
24 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
25 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
26 concentrations of methylmercury are harmful to the species, and the potential for increased
27 exposure varies substantially within the study area. Implementation of CM12 which contains
28 measures to assess the amount of mercury before project development, followed by appropriate
29 design and adaptation management, would minimize the potential for increased methylmercury
30 exposure, and would result in no adverse effect on the species. Tidal habitat restoration could result
31 in increased exposure of California least tern to methylmercury. However, it is unknown what
32 concentrations of methylmercury are harmful to the species. Sites-specific restoration plans that
33 address the creation and mobilization of mercury, as well as monitoring and adaptive management
34 as described in CM12 Methylmercury Management, would be available to address the uncertainty of
35 methylmercury levels in restored tidal marsh and potential impacts on California least tern. Tidal
36 habitat restoration could result in increased exposure of California least tern to selenium. This effect
37 would be addressed through the implementation of AMM27 Selenium Management, which would
38 provide specific tidal habitat restoration design elements to reduce the potential for
39 bioaccumulation of selenium and its bioavailability in tidal habitats.

40 With AMM1-7, AMM12, AMM27, and CM12 in place, in addition to the implementation of Mitigation
41 Measure BIO-66, the indirect effects of plan implementation would not result in a substantial
42 adverse effect on the species through habitat modification or potential mortality of a special-status
43 species. Therefore, With these measures in place, the indirect effects of Alternative 4

1 implementation would ~~have a less-than-significant impact not have an adverse effect~~ on California
2 least tern.

3 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**
4 **Indirect Effects on Colonies Will Be Minimized**

5 See Mitigation Measure BIO-66 under Impact BIO-66.

6 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**
7 **Facilities**

8 ~~The risk of mortality of California least tern from the construction of new transmission lines is~~
9 ~~considered to be minimal based on tern flight behaviors and its unlikely use of habitats near the~~
10 ~~transmission line corridors. Terns exhibit low wing loading and high aspect-ratio wings and as a~~
11 ~~result can maneuver relatively quickly around an obstacle such as a transmission line. Their wing~~
12 ~~structure and design allows for rapid flight and quick, evasive actions (see Draft BDCP Appendix 5.J,~~
13 ~~Attachment 5J.C, Analysis of Potential Bird Collisions at Proposed BDCP Powerlines). Marking~~
14 ~~transmission lines with flight diverters that make the lines more visible to birds has been shown to~~
15 ~~dramatically reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)~~
16 ~~estimated that marking devices in the Central Valley could reduce avian mortality by 60%. All new~~
17 ~~project transmission lines would be fitted with flight diverters. Bird flight diverters would make~~
18 ~~transmission lines highly visible to California least terns and would substantially reduce the~~
19 ~~potential for powerline collisions.~~

20 ~~New transmission lines would increase the risk for bird power line strikes, which could result in~~
21 ~~injury or mortality of California least tern. This risk is considered to be minimal based on tern flight~~
22 ~~behaviors and its unlikely use of habitats near the transmission line corridors.~~

23 **NEPA Effects:** ~~The construction and presence of new transmission lines would not represent an~~
24 ~~adverse effect on California least tern as a result of direct mortality of a special-status species~~
25 ~~because they are uncommon in the vicinity of proposed transmission lines and because the~~
26 ~~probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new~~
27 ~~transmission lines constructed as a result of the project would be fitted with bird diverters, which~~
28 ~~have been shown to reduce avian mortality by 60%. By implementing AMM20 Greater Sandhill~~
29 ~~Crane, the construction and operation of transmission lines would not result in an adverse effect on~~
30 ~~California least tern~~
31 ~~The construction and presence of new transmission lines would not represent~~
32 ~~an adverse effect on California least tern as a result of direct mortality of a special-status species~~
33 ~~because they are not known to be present in areas of disturbance and because the probability of~~
34 ~~bird-powerline strikes is unlikely due to tern flight behaviors.~~

34 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-
35 than-significant impact on California least tern as a result of direct mortality of a special-status
36 species because they are uncommon in the vicinity of proposed transmission lines and because the
37 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
38 transmission lines constructed as a result of the project would be fitted with bird diverters, which
39 have been shown to reduce avian mortality by 60%. By implementing AMM20 Greater Sandhill
40 Crane, the construction and operation of transmission lines would result in a less-than-significant
41 impact on California least tern
42 ~~not known to be present in areas of disturbance and because the~~
43 ~~probability of bird-powerline strikes is unlikely due to tern flight behaviors.~~

1 Greater Sandhill Crane

2 This section describes the effects of Alternative 4, including water conveyance facilities construction
 3 and implementation of other conservation components, on greater sandhill crane. Greater sandhill
 4 cranes in the study area are almost entirely dependent on privately owned agricultural lands for
 5 foraging. Long-term sustainability of the species is thus dependent on providing a matrix of
 6 compatible crop types that afford suitable foraging habitat and maintaining compatible agricultural
 7 practices, while sustaining and increasing the extent of other essential habitat elements such as
 8 night roosting habitat. The habitat model for greater sandhill crane includes “roosting and foraging”
 9 and “foraging” habitat. These habitat types include certain agricultural types, specific grassland
 10 types, irrigated pastures and hay crops, managed seasonal wetland, and other natural seasonal
 11 wetland. Roosting and foraging habitat includes known, traditional roost sites that also provide
 12 foraging habitat ([BDCP-see Appendix 2.A Covered Species Accounts, of the Draft BDCP](#)). Both
 13 temporary and permanent roost sites were identified for greater Sandhill crane. Permanent roosting
 14 and foraging sites are those used regularly, year after year, while temporary roosting and foraging
 15 sites are those used in some years. Factors included in assessing the loss of foraging habitat for the
 16 greater sandhill crane includes the relative habitat value of specific crop or land cover types, and
 17 proximity to known roost sites. Foraging habitat for greater sandhill crane included crop types and
 18 natural communities up to 4 miles from known roost sites, within the boundary of the winter crane
 19 use area ([BDCP-see Appendix 2.A, Covered Species Accounts, of the Draft BDCP](#)).

20 Construction and restoration associated with Alternative 4 conservation measures would result in
 21 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as
 22 indicated in Table 12-4-28. Full implementation of Alternative 4 would also include the following
 23 conservation actions over the term of the BDCP to benefit the greater sandhill crane ([BDCP-see](#)
 24 [Chapter 3, Section 3.3, Biological Goals and Objectives, of the Draft BDCP](#)).

- 25 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
 26 least 80% maintained in very high-value types in any given year. This protected habitat will be
 27 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
 28 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
 29 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
 30 GSHC1.1, associated with CM3).
- 31 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
 32 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
 33 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
 34 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
 35 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
 36 habitat loss (Objective GSHC1.2, associated with CM3).
- 37 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
 38 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
 39 and local seasonal flood events. The wetlands will be located within 2 miles of existing
 40 permanent roost sites and protected in association with other protected natural community
 41 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
 42 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 43 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
 44 project boundary. The complexes will be no more than 2 miles apart and will help provide
 45 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each

1 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
2 roosting habitat, and will be protected in association with other protected natural community
3 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
4 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
5 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
6 support roosting cranes and provide highest-value foraging habitat, provided such substitution
7 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
8 greater sandhill crane. (Objective GSHC1.4, associated with CM10).

- 9 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
10 sites. The habitat will consist of active cornfields that are flooded following harvest to support
11 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
12 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
13 be sited with consideration of the location of roosting habitat loss and will be in place prior to
14 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 15 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
16 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 17 ● Target cultivated land conservation to provide connectivity between other conservation lands
18 (Objective CLNC1.2, associated with CM3).
- 19 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
20 lands that occur in cultivated lands within the reserve system, including, water conveyance
21 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

22 As explained below, with the restoration and protection of these amounts of habitat, in addition to
23 natural community enhancement and management commitments (including *CM12 Methylmercury*
24 *Management* [as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS](#)) and
25 implementation of *AMM1-AMM7*, *AMM6*, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium*
26 *Management* [\(as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS\)](#), and
27 *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on the greater sandhill crane
28 would [not be adverse for NEPA purposes and would](#) be less than significant for CEQA purposes.

1
2

Table 12-4-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	3	3	NA	NA
	Roosting and Foraging - Temporary	16	16	85	85	NA	NA
	Foraging	1,799	1,799	850	850	NA	NA
Total Impacts CM1		1,815	1,815	938	938	NA	NA
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
Total Impacts CM2-CM18		2,776	4,408	0	0	0	0
Total Roosting/Foraging - Permanent		0	0	3	3	0	0
Total Roosting/Foraging - Temporary		16	57	85	85	0	0
Total Foraging		4,575	6,166	850	850	0	0
TOTAL IMPACTS		4,591	6,223	938	938	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

4 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**
5 **Crane**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 94,145 acres of modeled roosting and foraging habitat (70,57 acres of permanent loss, 24,88
8 acres of temporary loss) and 8,0267,161 acres of foraging habitat for greater sandhill crane
9 (7,0656,223 of permanent loss, 961,938 acres of temporary loss; see Table 12-4-28). Conservation

measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of ~~reusable tunnel material borrow and spoil~~ areas (CM1), Tidal Natural Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh Natural Community Restoration (CM10), and Natural Communities Enhancement and Management (CM11). The majority of habitat loss would result from water conveyance facility construction and conversion of habitat to tidal natural communities through CM4. Habitat enhancement and management activities through 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 greater sandhill crane modeled 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*: Construction of Alternative 4 conveyance facilities as they are currently designed would result in the combined permanent loss of up to ~~2,7281,815~~ acres of modeled greater sandhill crane habitat. This would consist of the permanent removal of ~~29-16~~ acres of temporary roosting and foraging habitat, and ~~2,6991,799~~ acres of foraging habitat. Foraging habitat that would be permanently impacted by CM1 would consist of ~~2,1381,050~~ acres of very high-value, ~~169-29~~ acres of high-value, ~~and 365-199~~ acres of medium-value, ~~and 492 acres of low-value~~ foraging habitat (Table 12-4-29). In addition, ~~8-3~~ acres of permanent roosting and foraging habitat, ~~16-85~~ acres of temporary roosting and foraging habitat, and ~~961-850~~ acres of foraging habitat would be temporarily removed (Table 12-4-29). The temporarily removed habitat would consist primarily of cultivated lands and it would be restored within one year following construction; ~~h~~ However, it would not necessarily be restored to its original topography and it could be restored as grasslands in the place of cultivated lands. CM1 activities that would result in temporary impacts would include temporary access roads, ~~reusable tunnel material borrow and spoil~~ sites, and work areas for construction.

The acres of ~~temporary and permanent~~ roosting and foraging habitat that would be removed ~~would occur from the construction of a temporary transmission line is located on Staten Island, Zacharias Island, Bouldin Island, and Venice Island and the losses would be a result of installation of permanent and temporary transmission lines and from the construction of a temporary concrete batch plant and a permanent access road on Bouldin Island; associated access roads. However~~ however, the implementation of *AMM20 Greater Sandhill Crane* would require that CM1 activities be designed to avoid direct loss of crane roost sites. This includes a provision that the final transmission line alignment would be designed to avoid crane roost sites. Avoidance of crane roost sites would be accomplished either by siting activities outside of identified roost sites or by relocating the roost site if it consisted of cultivated lands (roost sites consisting of wetlands would not be subject to re-location). Relocated roost sites would be established prior to construction activities affecting the original roost site (as described in *AMM20 Greater Sandhill Crane, in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix 3.C*). Therefore there would be no loss of crane roosting and foraging habitat as a result of water conveyance facility construction once the facilities were fully designed. The potential for ~~injury and direct mortality~~ greater sandhill crane bird strike on ~~from~~ electrical transmission facilities is addressed below under Impact BIO-70.

1 Approximately ~~2,347,148~~ acres of the permanent loss of foraging habitat would be from the
 2 storage of reusable tunnel material. This material would likely be moved to other sites for use in
 3 levee build-up and restoration, and the affected area would likely eventually be restored. ~~While~~
 4 ~~This this~~ effect is categorized as permanent because there is no assurance that the material
 5 would eventually be moved, ~~the effect would likely be temporary. The actual footprint of the~~
 6 ~~storage areas required for reusable tunnel material is flexible, and the actual acreage of habitat~~
 7 ~~affected by this activity could be reduced based on the height of the storage piles in addition to~~
 8 ~~other considerations.~~ The implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*
 9 *Material, and Dredged Material* ([see Appendix D, Substantive BDCP Revisions, of this](#)
 10 [RDEIR/SDEIS](#)), would require that the areas used for reusable tunnel material storage be
 11 minimized in crane foraging habitat and completely avoid crane roost sites.

12 ~~Construction-related activities would not be expected to result in direct mortality of greater~~
 13 ~~sandhill crane if they were present in the study area, because cranes would be expected to avoid~~
 14 ~~contact with construction and other equipment. The potential for greater sandhill crane bird~~
 15 ~~strike on electrical transmission lines is discussed below under Impact BIO-70.~~

16 ~~Staten Island is among the most significant crane use areas in the Delta (Littlefield and Ivey~~
 17 ~~2000) and approximately 1,257 acres of the foraging habitat permanently lost would be from~~
 18 ~~storage of reusable tunnel material on Staten Island. As described above, AMM6 would require~~
 19 ~~that the actual footprint of this impact be minimized in crane foraging habitat. Specifically,~~
 20 ~~AMM6 would require that reusable tunnel material storage on Staten Island be sized and located~~
 21 ~~in coordination with greater sandhill crane experts, USFWS, and CDFW to reduce potential~~
 22 ~~effects on greater sandhill crane. AMM20 Greater Sandhill Crane includes specific measures to~~
 23 ~~reduce potential effects of construction on greater sandhill cranes on Staten Island. A conveyor~~
 24 ~~belt located down the center of Staten Island would convey RTM from the tunnel to the RTM~~
 25 ~~storage area at the south end of the island. This would potentially minimize the disturbance of~~
 26 ~~increased truck traffic for RTM disposal although the effects of the conveyor belt on sandhill~~
 27 ~~cranes cannot be directly quantified.~~ The effects of noise and visual disturbance from CM1
 28 construction activities are discussed under Impact BIO-71. Refer to the Terrestrial Biology Map
 29 [Book in Appendix A of this RDEIR/SDEIS](#) for a detailed view of Alternative 4 construction
 30 locations. Impacts from CM1 would occur within the first 10-~~14~~ years of Alternative 4
 31 implementation.

32 **Table 12-4-29. Value of Greater Sandhill Crane Foraging Habitat affected by Alternative 4**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1	Acres Affected by CM2-CM18
		{[temporary] (acres)tempor ary}	(permanent acres(temporar y)
Very high	Corn, rice	474 [224]2,138 (209)	525-576 (0)
	Alfalfa and alfalfa mixtures, mixed pasture, native pasture, wheatWheat, other pasture, irrigated pasture, managed	202 [95]169 (263)	1,732,662 (0)
High	wetlands, native vegetation		

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent (temporary) (acres)tempor ary)	Acres Affected by CM2–CM18 (permanent acres(temporar y)
Medium	<u>Alfalfa and alfalfa mixtures, irrigated mixed pasture, irrigated native pasture, irrigated pasture, irrigated other pasture, Grain-grain</u> and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, <u>sudan</u> , miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	579 [273]365 (244)	1,018-784 (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, <u>sudan</u> , sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry), <u>native vegetation</u>	544 [257]17 (216)	1,069-374 (0)
<u>TotalNone</u>	<u>Vineyards, orchards</u>	1,799 [850]12 (29)	4,396-23 (0)

- 1 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
2 footprint, this activity would result in the permanent loss or conversion of approximately 2,754
3 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging
4 habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of
5 78 acres of very high-value, 1,199-129 acres of high value, 855-1,621 acres of medium-value, and
6 558-863 acres of low-value foraging habitat ~~(Table 12-4-29)~~. This loss would occur in the
7 Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur
8 between the high crane use areas of the central Delta and the Cosumnes River Preserve.
9 However, the conversion of grasslands and cultivated lands to tidal wetlands would not prohibit
10 crane movement or reduce use of these areas. In CZ 5, loss of modeled habitat would occur along
11 the western edge of the greater sandhill crane winter use area and therefore would not result in
12 fragmentation of traditional crane habitats. Therefore fragmentation of habitat from tidal
13 restoration activities would be expected to be minimal. Approximately 1,951 acres of foraging
14 habitat would be impacted within the first 10 years of Alternative 4 implementation.
- 15 • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands that
16 provide foraging habitat for greater sandhill crane would be converted to grassland by the late
17 long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration
18 activities. The restored grasslands would continue to provide foraging habitat value for the
19 greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of
20 Alternative 4 implementation.
- 21 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
22 conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill
23 crane. A portion of the restored nontidal marsh would be expected to continue to provide
24 roosting and foraging habitat value for the greater sandhill crane. However, some of this
25 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open
26 water that would be too deep to provide suitable roosting or foraging habitat. Approximately

1 567 acres of habitat would be converted to nontidal marsh within the first 10 years of
2 Alternative 4 implementation.

- 3 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
4 actions included in CM11 that are designed to enhance wildlife values in restored or protected
5 habitats could result in localized ground disturbances that could temporarily remove small
6 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
7 vegetation and road and other infrastructure maintenance activities, would be expected to have
8 minor adverse effects on available habitat and would be expected to result in overall
9 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
10 these activities to result in direct mortality of greater sandhill crane would be minimized with
11 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction
12 of recreational-related facilities including trails, interpretive signs, and picnic tables ([BDCP-see](#)
13 [Chapter 4, Covered Activities and Associated Federal Actions, of the Draft BDCP](#)). The construction
14 of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on
15 existing, disturbed areas when and where possible. If new ground disturbance was necessary,
16 greater sandhill crane habitat would be avoided, with the exception of a permanent loss of 4
17 acres of grassland foraging habitat (1 acre of which would be impacted within the first 10 years
18 of Alternative 4 implementation).
- 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 greater sandhill crane use of the surrounding habitat.
22 Maintenance activities would include vegetation management, levee and structure repair, and
23 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill
24 cranes are sensitive to disturbance. However, potential impacts would be reduced by AMMs and
25 conservation actions as described below.
- 26 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
27 direct mortality of greater sandhill crane if they were present in the study area, because they
28 would be expected to avoid contact with construction and other equipment. Potential effects
29 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
30 The potential for injury and direct mortality from electrical transmission facilities is discussed
31 below under Impact BIO-70.

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. Based on current design footprints,
40 Alternative 4 would remove [53-104](#) acres roosting and foraging habitat ([29-16](#) acres of permanent
41 loss, [24-88](#) acres of temporary loss) in the study area in the near-term. These effects would result
42 from the construction of the water conveyance facilities (CM1). In addition, [65,436-425](#) acres of
43 foraging habitat would be removed or converted in the near-term (CM1, [3,6602,649](#) acres; *CM4*
44 *Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11*

1 *Natural Communities Enhancement and Management*—2,776 acres). Of these near-term acres of
2 foraging habitat impact, ~~53,315-839~~ acres would be ~~moderate~~medium- to very high-value habitat
3 (CM1, ~~3,388-1912~~ acres, CM4-11, 1,927 acres).

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 greater sandhill crane in
6 Chapter 3, *Conservation Strategy*, of the *Draft* BDCP would be 1:1 protection and 1:1 restoration for
7 loss of roost sites and 1:1 protection of high- to very high-value foraging habitat for loss of
8 ~~moderate~~medium- to very high-value foraging habitat. Using these ratios would indicate that ~~53-104~~
9 acres of greater sandhill crane roosting habitat should be restored/created and ~~53-104~~ acres should
10 be protected to compensate for the CM1 losses of greater sandhill crane roosting and foraging
11 habitat. In addition, ~~3,660-1,912~~ acres of high- to very high-value foraging habitat should be
12 protected to mitigate the CM1 losses of greater sandhill crane ~~moderate~~medium- to very high-value
13 foraging habitat. The near-term effects of other conservation actions would remove 1,927 acres of
14 moderate- to very high-value foraging habitat, and therefore require 1,927 acres of protection of
15 high- to very high-value foraging habitat using the same typical NEPA and CEQA ratios (1:1
16 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1 protection for the
17 loss of foraging habitat).

18 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
19 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
20 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
21 result of water conveyance facility construction once the facilities were fully designed, which would
22 avoid the CM1 impact on ~~53-104~~ acres of roosting and foraging habitat once the project design is
23 final. Indirect effects of construction-related noise and visual disturbance are discussed below under
24 Impact BIO-71.

25 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
26 protecting 15,600 acres of cultivated lands in the Plan Area (*see* Table 3-4 in Chapter 3, *Description*
27 *of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM10
28 and would occur in the same timeframe as the construction and early restoration losses.

29 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
30 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
31 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
32 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
33 Sandhill Crane Winter Use Area, and would be in place prior to roosting habitat loss. Of the 500
34 acres of managed wetlands to be created for roosting habitat, 320 acres would be created in
35 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or
36 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise and
37 local seasonal flood events. These wetlands would be created within 2 miles of existing permanent
38 roost sites and protected in association with other protected natural community types at a ratio of
39 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
40 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
41 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
42 constructed within the Stone Lakes NWR project boundary (*see Draft* BDCP Chapter 3, Figure 3.3-6)
43 and would be designed to provide connectivity between the Stone Lakes and Cosumnes greater
44 sandhill crane populations (Objective GSHC1.4). The large patch sizes of these wetland complexes

1 would provide additional conservation to address the threats of vineyard conversion, urbanization
2 to the east, and sea level rise to the west of greater sandhill crane wintering habitat.

3 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
4 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
5 BIO-69a would be available to guide the near-term protection of cultivated lands to ensure that the
6 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
7 compensated for with appropriate crop types and natural communities.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
15 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
16 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

17 **Late Long-Term Timeframe**

18 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
19 acres of foraging habitat for greater sandhill crane. Alternative 4 as a whole would result in the
20 permanent loss of and temporary effects on ~~94,145~~ acres of roosting and foraging habitat (less than
21 1% of the total habitat in the study area) and ~~87,026-161~~ acres of foraging habitat (54% of the total
22 habitat in the study area) for the greater sandhill crane during the term of the Plan. The foraging
23 habitat lost by the late long-term timeframe would consist of ~~6,663-212~~ acres of medium- to very
24 high-value foraging habitat. The locations of these losses are described above in the analyses of
25 individual conservation measures. The implementation of *AMM20 Greater Sandhill Crane* would
26 require that no roost sites were directly affected by water conveyance facilities including
27 transmission lines and associated footprints. In addition, temporarily removed habitat would be
28 restored within 1 year following construction. However, it would not necessarily be restored to its
29 original topography and it could result in the conversion of cultivated lands to grasslands.

30 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
31 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
32 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
33 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
34 GSHC1.1).

35 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
36 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
37 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
38 and local seasonal flood events. These wetlands would be created within 2 miles of existing
39 permanent roost sites and protected in association with other protected natural community types at
40 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
41 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
42 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
43 constructed within the Stone Lakes NWR project boundary ([see Draft BDCP Chapter 3, Figure 3.3-6](#))
44 and would be designed to provide connectivity between the Stone Lakes and Cosumnes greater

1 sandhill crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre
 2 wetland complexes each consisting of at least three wetlands and would be no more than 2 miles
 3 apart. The large patch sizes of these wetland complexes would provide additional conservation to
 4 address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west of
 5 greater sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be
 6 created within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would
 7 consist of active cornfields that are flooded following harvest to support roosting cranes and also
 8 provide the highest-value foraging habitat for the species. Individual fields would be at least 40
 9 acres could shift locations throughout the Greater Sandhill Crane Winter Use Area, but would be
 10 sited with consideration of the location of roosting habitat loss and would be in place prior to
 11 roosting habitat loss.

12 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
 13 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
 14 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
 15 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
 16 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
 17 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
 18 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
 19 economically driven agricultural practices, protecting crane habitat would provide enhanced
 20 stability to agricultural habitat value within the crane use area that does not currently exist.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 28 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 29 [RDEIR/SDEIS.BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

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 effects of construction would not be adverse under NEPA. Based on current design footprints,
 36 Alternative 4 would remove ~~53,104~~ acres roosting and foraging habitat (~~29,16~~ acres of permanent
 37 loss, ~~24,88~~ acres of temporary loss) in the study area in the near-term. These effects would result
 38 from the construction of the water conveyance facilities (CM1). In addition, ~~6,4365,425~~ acres of
 39 foraging habitat would be removed or converted in the near-term (CM1, ~~32,660-649~~ acres; *CM4*
 40 *Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11*
 41 *Natural Communities Enhancement and Management*—2,776 acres). Of these near-term acres of
 42 foraging habitat impact, ~~53,315-839~~ acres would be ~~moderate/medium-~~ to very high-value habitat
 43 (CM1, ~~31,388-912~~ acres, CM4-11, 1,927 acres).

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 greater sandhill crane in
3 Chapter 3, Conservation Strategy, of the Draft BDCP would be 1:1 protection and 1:1 restoration for
4 loss of roost sites and 1:1 protection of high- to very high-value foraging habitat for loss of
5 moderate- to very high-value foraging habitat. Using these ratios would indicate that 53-104 acres of
6 greater roosting habitat should be restored/created and 53-104 acres should be protected to
7 compensate for the CM1 losses of greater sandhill crane roosting and foraging habitat. In addition,
8 3,660,912 acres of high- to very high-value foraging habitat should be protected to mitigate the
9 CM1 losses of greater sandhill crane moderate- to very high-value foraging habitat. The near-term
10 effects of other conservation actions would remove 1,927 acres of moderate- to very high-value
11 foraging habitat, and therefore require 1,927 acres of protection of high- to very high-value foraging
12 habitat using the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss
13 of roosting and foraging habitat; 1:1 protection for the loss of foraging habitat).

14 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
15 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
16 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
17 result of water conveyance facility construction once the facilities were fully designed, which would
18 avoid the CM1 impact on 53-104 acres of roosting and foraging habitat once the project design is
19 final. Indirect effects of construction-related noise and visual disturbance are discussed below under
20 Impact BIO-71.

21 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
22 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*
23 *Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM10
24 and would occur in the same timeframe as the construction and early restoration losses.

25 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
26 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
27 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
28 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
29 Sandhill Crane Winter Use Area, and would be in place prior to roosting habitat loss. Of the 500
30 acres of managed wetlands to be created for roosting habitat, 320 acres would be created in
31 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or
32 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise and
33 local seasonal flood events. These wetlands would be created within 2 miles of existing permanent
34 roost sites and protected in association with other protected natural community types at a ratio of
35 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
36 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
37 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
38 constructed within the Stone Lakes NWR project boundary (see Draft BDCP Chapter 3, Figure 3.3-6)
39 and would be designed to provide connectivity between the Stone Lakes and Cosumnes greater
40 sandhill crane populations (Objective GSHC1.4). The large patch sizes of these wetland complexes
41 would provide additional conservation to address the threats of vineyard conversion, urbanization
42 to the east, and sea level rise to the west of greater sandhill crane wintering habitat.

43 The Plan also includes commitments to implement AMM1 Worker Awareness Training, AMM2
44 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention
45 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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
5 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
6 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

7 In the absence of other conservation actions, the effects on greater sandhill crane habitat from
8 Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status
9 species and potential for direct mortality. At least 15,600 acres of cultivated lands that provide
10 habitat for covered and other native wildlife species would be protected in the near-term time
11 period (Objective CLNC1.1). Mitigation Measure BIO-69a would be available to guide the near-term
12 protection of cultivated lands to ensure that the near-term impacts of moderate- to very high-value
13 habitat for greater sandhill crane were compensated for with appropriate crop types and natural
14 communities. Considering the conservation actions described above, and AMMs 1-7 and AMM20,
15 Alternative 4, over the term of the BDCP would not result in a substantial adverse effect through
16 habitat modifications and would not substantially reduce the number or restrict the range of greater
17 sandhill cranes. Therefore, Alternative 4 would have a less-than-significant impact on greater
18 sandhill cranes. No mitigation would be required.

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 23,919 acres of roosting and foraging habitat and 164,676
28 acres of foraging habitat for greater sandhill crane. Alternative 4 as a whole would result in the
29 permanent loss of and temporary effects on 94,145 acres of roosting and foraging habitat (less than
30 1% of the total habitat in the study area) and 87,026-161 acres of foraging habitat (54% of the total
31 habitat in the study area) for the greater sandhill crane during the term of the Plan. The foraging
32 habitat lost by the late long-term timeframe would consist of 6,663-212 acres of medium- to very
33 high-value foraging habitat. The locations of these losses are described above in the analyses of
34 individual conservation measures. The implementation of *AMM20 Greater Sandhill Crane* would
35 require that no roost sites were directly affected by water conveyance facilities including
36 transmission lines and associated footprints. In addition, temporarily removed habitat would be
37 restored within 1 year following construction. However, it would not necessarily be restored to its
38 original topography and it could 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 ([see Draft BDCP Chapter 3, Figure 3.3-6](#))
 10 and would be designed to provide connectivity between the Stone Lakes and Cosumnes greater
 11 sandhill crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre
 12 wetland complexes each consisting of at least three wetlands and would be no more than 2 miles
 13 apart. The large patch sizes of these wetland complexes would provide additional conservation to
 14 address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west of
 15 greater sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be
 16 created within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would
 17 consist of active cornfields that are flooded following harvest to support roosting cranes and also
 18 provide the highest-value foraging habitat for the species. Individual fields would be at least 40
 19 acres could shift locations throughout the Greater Sandhill Crane Winter Use Area, but would be
 20 sited with consideration of the location of roosting habitat loss and would be in place prior to
 21 roosting habitat 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 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
 38 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
 39 *[RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

40 [In the absence of other conservation actions, the effects on greater sandhill crane habitat from](#)
 41 [Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status](#)
 42 [species and potential for direct mortality.](#) Considering Alternative 4's protection and restoration
 43 provisions, in addition to Mitigation Measure BIO-69a, which would compensate for the loss of
 44 medium- to very high-value foraging habitat at a ratio of 1:1 prior to or concurrent with impacts,
 45 loss of habitat and direct mortality through implementation of Alternative 4 would not result in a
 46 substantial adverse effect through habitat modifications and would not substantially reduce the

1 number or restrict the range of the species. Therefore, ~~the alternative~~ Alternative 4 would have a
2 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 must compensate for 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 with the impacts, to minimize the effects
8 of habitat loss. The crop types and natural communities that are included in foraging habitat
9 value categories are listed in Table 12-4-29. Foraging habitat conservation must occur within
10 the greater sandhill crane winter use area and the location of protected habitat or conservation
11 easements must be preapproved by the USFWS and CDFW.

12 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission** 13 **Facilities**

14 Greater sandhill cranes are susceptible to collision with power lines and other structures during
15 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,
16 Brown and Drewien 1995, Manville 2005). There are extensive existing transmission and
17 distribution lines in the sandhill crane winter use area. These include a network of distribution lines
18 that are between 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area,
19 one that overlaps with the greater sandhill crane winter use area between Antioch and I-5 east of
20 Hood, and one that crosses the northern tip of the crane winter use area north of Clarksburg. There
21 are 69-kv lines within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road,
22 and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes National Wildlife Refuge. At the
23 south end of the winter use area, there are three 230-kV transmission lines that follow I-5, and then
24 cut southwest through Holt, and two 500-kV lines cross the southwestern corner of the winter use
25 area. This existing network of power lines in the study currently poses a collision and electrocution
26 risk for sandhill cranes, because they cross over or surround sandhill crane roost sites in the study
27 area.

28 Both permanent and temporary electrical transmission lines would be constructed to supply
29 construction and operational power to Alternative 4 facilities, as described below. The potential
30 mortality of greater sandhill crane in the area of the proposed transmission lines was estimated for
31 the Draft BDCP using collision mortality rates developed by Brown and Drewien (1995) and an
32 estimate of potential crossings along the proposed lines (See Draft BDCP Appendix 5J.C. *Analysis of*
33 *Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis concluded that mortality risk
34 could be substantially reduced by marking new transmission lines to increase their visibility to
35 sandhill cranes.

36 Alternative 4 substantially reduced the length of permanent and temporary transmission lines as
37 compared to the Draft BDCP, substantially reducing the likelihood of crane collisions. Under
38 Alternative 4, no permanent transmission lines would be constructed within the greater sandhill
39 crane winter use area. In addition, no new transmission lines (permanent or temporary) would be
40 constructed in the vicinity of Staten Island which is one of the most important wintering sites for
41 greater sandhill cranes in the Delta. The Alternative 4 transmission line alignment within the greater
42 sandhill crane winter use area would be limited to three segments of temporary transmission lines:
43 a temporary 11-mile segment extending north and south between Intake 2 and the intermediate

1 forebay, a temporary 9-mile segment extending east and west between the intermediate forebay
2 and the SMUD/WAPA substation, and an 11-mile segment extending north and south between
3 Bouldin Island and Victoria Island. These three temporary lines would be removed after
4 construction of the water conveyance facilities, after 10–14 years. Limiting the proposed
5 transmission line footprint to temporary lines and siting these lines away from the highest use areas
6 by greater sandhill cranes, substantially reduces the potential for sandhill crane bird strike in
7 Alternative 4 as compared to the Draft BDCP.

8 In addition, after the BDCP Draft EIR/EIS was issued in December of 2013, additional avoidance
9 features were added to AMM20 Greater Sandhill Crane. AMM20 Greater Sandhill Crane requires that
10 Alternative 4 meets the performance standard of no mortality of greater sandhill crane associated
11 with the new facilities. This would be achieved by implementing one or any combination of the
12 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating
13 or undergrounding existing lines where feasible; (3) using natural gas generators in lieu of installing
14 transmission lines in high-risk zones of the greater sandhill crane winter use area (4)
15 undergrounding new lines in high-risk zones of the greater sandhill crane winter use area, (5)
16 permanently installing flight diverters on existing lines over lengths equal to or greater than the
17 length of the new temporary transmission lines in the crane winter use area; and/or (6) for areas
18 outside of the Stone Lakes National Wildlife Refuge project boundary, shifting locations of flooded
19 areas that provide crane roosts to lower risk areas. These measures are described in detail in
20 AMM20 Greater Sandhill Crane (Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS).

21 The implementation of the measures described above under AMM20 Greater Sandhill Crane, in
22 addition to the project design changes to avoid high crane use areas, would substantially reduce the
23 potential for crane collisions with transmission lines. Potential measures that would eliminate this
24 risk include using natural gas generators in lieu of transmission lines or undergrounding new lines
25 in high-risk zones in the greater sandhill crane winter use area. Marking transmission lines with
26 flight diverters that make the lines more visible to birds has been shown to dramatically reduce the
27 incidence of bird mortality, including for sandhill cranes (Brown and Drewien 1995). Yee (2008)
28 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. All new
29 temporary transmission lines would be fitted with flight diverters. The installation of flight diverters
30 on existing permanent lines would be prioritized in the highest risk zones for greater sandhill crane
31 (as described in Draft BDCP Appendix 5J.C, Analysis of Potential Bird Collisions at Proposed BDCP
32 Powerlines) and diverters would be installed in a configuration that research indicates would reduce
33 bird strike risk by at least 60%. Diverters would be installed on existing lines at a rate of one foot of
34 existing transmission line for every one foot of new project transmission line constructed, in an area
35 with equal or higher greater sandhill crane bird strike risk. Placing diverters on existing lines would
36 be expected to reduce existing mortality in the Plan Area and therefore result in a net benefit to the
37 greater sandhill crane population because these flight diverters would be maintained in perpetuity.
38 New transmission lines installed in the study area would increase the risk for bird-power line
39 strikes, which could result in injury or mortality of greater sandhill cranes. Both permanent and
40 temporary electrical transmission lines would be constructed to supply construction and
41 operational power to BDCP facilities. Typically, higher voltage (230 kilovolt [kV]) lines vary in
42 height from 90 to 110 feet, while “sub” transmission (69 kV) lines vary from 50 to 70 feet (Avian
43 Power Line Interaction Committee 2006). The Alternative 4 alignment would require the
44 installation of both permanent and temporary transmission lines extending north and south through
45 much of the crane use area. In addition, a transmission line would be constructed between the cities
46 of Hood and Locke eastward toward SR 99 which would require the installation of approximately 17

1 miles of permanent transmission line (10 miles of 230-kV line and 7 miles of 69-kV line) and
2 approximately 46 miles (21 miles of 230-kV line and 25 miles of 69-kV line) of temporary
3 transmission line. The temporary transmission lines that would be constructed on Staten Island
4 would occur within the highest birdstrike risk area in the study area as Staten Island is one of the
5 most important wintering sites for greater sandhill cranes in the Delta. Temporary lines would be
6 removed after construction of the water conveyance facilities, within 10 years.

7 Existing transmission lines in the sandhill crane winter use area include a network of distribution
8 lines that are between 11 and 22 kV. In addition, there are two 115-kV lines (one that overlaps with
9 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of
10 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,
11 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes
12 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV
13 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross
14 the southwestern corner of the winter use area. This existing network of power lines in the study
15 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or
16 surround sandhill crane roost sites in the study area. New transmission lines would increase this
17 risk and have an adverse effect on the species in the absence of other conservation actions.

18 As described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
19 *BDCP Powerlines, of the Draft BDCP*, the potential mortality of greater sandhill crane in the area of
20 the proposed transmission lines was estimated using collision mortality rates by Brown and
21 Drewien (1995) and an estimate of potential crossings along the proposed lines. Results indicate
22 that in the absence of any line marking to increase visibility and reduce collision risk (i.e., without
23 minimization measures), the average annual mortality of greater sandhill crane at permanent lines
24 would be up to 18 fatalities per year and would be 120 fatalities per year at temporary lines.

25 Marking transmission lines with devices that make the lines more visible to birds has been shown to
26 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and
27 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality
28 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual
29 mortality rate would be estimated to decrease to 7 fatalities per year for the permanent lines and 41
30 fatalities per year for the temporary lines.

31 The current proposed transmission line alignment under Alternative 4 is not fully designed, and line
32 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
33 final transmission line alignment would not result in a net increase in bird strike risk to greater
34 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the
35 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating
36 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter
37 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,
38 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be
39 expected to reduce existing mortality and thus fully offset the overall population effects of new
40 transmission lines. Designing the alignment to minimize risk and removing, relocating, or
41 undergrounding existing lines would be given priority out of the above methods. With these
42 measures, and considering that the temporary lines would be removed within the first 10 years of
43 Alternative 4 implementation, the risk of greater sandhill crane mortality from transmission lines
44 would be reduced substantially.

1 **NEPA Conclusion:** 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. Under
3 Alternative 4, proposed transmission lines have been designed to substantially reduce the likelihood
4 of a crane collision with transmission lines. New transmission lines constructed as part of the
5 project would be limited to temporary lines which would be removed within the first 10–14 years of
6 Alternative 4 implementation. In addition, no new transmission lines would be sited in the vicinity
7 of Staten Island, which has the highest crane-use in the greater sandhill crane winter use area. All
8 new transmission lines constructed as a result of the project would be fitted with bird diverters,
9 which have been shown to reduce avian mortality by 60%. By incorporating one or a combination of
10 the measures to greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*, the
11 construction and operation of transmission lines under Alternative 4 would not result in an adverse
12 effect on greater sandhill crane.

13 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
14 existing network of power lines in the study area currently poses a risk for sandhill cranes. Under
15 Alternative 4, proposed transmission lines have been designed to substantially reduce the likelihood
16 of a crane collision with transmission lines. New transmission lines constructed as part of the
17 project would be limited to temporary lines which would be removed within the first 10–14 years of
18 Alternative 4 implementation. In addition, no new transmission lines would be sited in the vicinity
19 of Staten Island, which has the highest crane-use in the greater sandhill crane winter use area. All
20 new transmission lines constructed as a result of the project would be fitted with bird diverters,
21 which have been shown to reduce avian mortality by 60%. By incorporating one or a combination of
22 the measures to greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*,
23 and the construction and operation of transmission lines under Alternative 4 would have a less-
24 than-significant impact on greater sandhill crane.~~Sandhill cranes are known to be susceptible to~~
25 ~~collision with overhead wires. The existing network of power lines in the study area currently poses~~
26 ~~a risk for sandhill cranes. New transmission lines would increase the risk for bird-power line strikes,~~
27 ~~which could result in injury or mortality of greater sandhill crane. By incorporating line-marking~~
28 ~~devices on new transmission lines the estimated mortality rate would be 7 fatalities per year from~~
29 ~~permanent transmission lines and 41 fatalities per year from temporary transmission lines. The~~
30 ~~current proposed transmission line alignment under Alternative 4 is not fully designed, and line~~
31 ~~locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the~~
32 ~~final transmission line alignment avoided crane roost sites and achieved no net increase of greater~~
33 ~~sandhill crane strike risk in the Plan Area. With *AMM20 Greater Sandhill Crane*, and considering that~~
34 ~~the temporary lines would be removed within the first 10 years of Alternative 4 implementation, the~~
35 ~~risk of mortality from collision with transmission lines would tunderresult in a less-than-significant~~
36 ~~impact on the greater sandhill crane population.~~

37 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

38 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.
39 Noise and visual disturbances from the construction of water conveyance facilities and other
40 conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work
41 areas. Indirect effects associated with construction include noise, dust, and visual disturbance
42 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
43 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
44 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
45 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These

1 effects could result from periodic vehicle use along the conveyance corridor, inspection and
 2 maintenance of aboveground facilities, and similar activities. These potential effects would be
 3 minimized with implementation of *AMM20 Greater Sandhill Crane* described in [Appendix D,](#)
 4 [Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix 3.C, Avoidance and Minimization](#)
 5 [Measures.](#)

6 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
 7 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
 8 crane ([BDCP Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS Appendix D5.J,](#)
 9 [Attachment 5J.D, Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill](#)
 10 [Crane](#)). The analysis addressed the potential noise effects on cranes, and concluded that as much as
 11 ~~1320,421–43,125,243~~ acres of crane habitat could potentially be affected by general construction
 12 noise ([including pile driving](#)) above baseline level (50–60 dBA; [Table 12-4-30](#)). This would include
 13 ~~666–3,274,1,008~~ acres of permanent crane roosting habitat, ~~1,498–5,036,1,909~~ acres of temporary
 14 crane roosting habitat, and ~~11,258–34,816,17,327~~ acres of crane foraging habitat. ~~In addition, 120–~~
 15 ~~668 acres of permanent crane roosting habitat, 477–1,562 acres of temporary crane roosting~~
 16 ~~habitat, and 1,392–11,882 acres of crane foraging habitat could be affected by noise from pile~~
 17 ~~driving that would be above baseline level (50–60 dBA, Table 12-4-30).~~ The analysis was conducted
 18 based on the assumption that there would be direct line-of-sight from sandhill crane habitat areas to
 19 the construction site, and, therefore, provides a worst-case estimate of effects. In many areas the
 20 existing levees would partially or completely block the line-of-sight and would function as effective
 21 noise barriers, substantially reducing noise transmission. However, there is insufficient data to
 22 assess the effects that increased noise levels would have on sandhill crane behavior.

23 **Table 12-4-30. Greater Sandhill Crane Habitat Affected By General Construction and Pile Driving**
 24 **Noise Under Alternative 4 (acres)**

Habitat Type	General Construction	
	Above 60 dBA	Above 50 dBA
Permanent Roosting	666 <u>196</u>	3,274 <u>1,008</u>
Temporary Roosting	1,498 <u>810</u>	5,036 <u>1,909</u>
Foraging	11,258 <u>76</u>	34,816 <u>17,327</u>
Total Habitat	43,421 <u>8,681</u>	43,125 <u>20,243</u>

25
 26 Evening and nighttime construction activities would require the use of extremely bright lights.
 27 Nighttime construction could also result in headlights flashing into roost sites when construction
 28 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
 29 the use of safety lights that would alert low-flying aircraft to the presence of these structures
 30 because of their height. Little data is available on the effects of impact of artificial lighting on
 31 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
 32 to flush and it is thought that they may avoid roosting in areas where lighting is bright ([see BDCP](#)
 33 [Chapter 5, Effects Analysis, of the Draft BDCP](#)). If the birds were to roost in a brightly lit site, they
 34 may be vulnerable to sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual
 35 impacts from lighting include a reduction in the cranes' quality of nocturnal rest, and effects on their
 36 sense of photo-period which might cause them to shift their physiology towards earlier migration
 37 and breeding ([see BDCP Chapter 5, Effects Analysis, of the Draft BDCP](#)). Effects such as these could
 38 prove detrimental to the cranes' overall fitness and reproductive success (which could in turn have

1 population-level impacts). A change in photo-period interpretation could also cause cranes to fly out
2 earlier from roost sites to forage and might increase their risk of power line collisions if they were to
3 leave roosts before dawn ([see BDCP Chapter 5, Effects Analysis, of the Draft BDCP](#)).

4 The effects of noise and visual disturbance on greater sandhill crane would be minimized through
5 the implementation of *AMM20 Greater Sandhill Crane* ([Appendix D, Substantive BDCP Revisions, of](#)
6 [this RDEIR/SDEIS BDCP Appendix 3.C, Avoidance and Minimization Measures](#)). Activities within 0.75
7 mile of crane roosting habitat would reduce construction noise during night time hours (from one
8 hour before sunset to one hour after sunrise) such that construction noise levels do not exceed 50
9 dBA L_{eq} (1 hour) at the nearest temporary or permanent roosts during periods when the roost sites
10 are available (flooded). In addition, the area of crane foraging habitat that would be affected during
11 the day (from one hour after sunrise to one hour before sunset) by construction noise exceeding 50
12 dBA L_{eq} (1 hour) would also be minimized. Unavoidable noise related effects would be compensated
13 for by the enhancement of 0.1 acre of foraging habitat for every acre indirectly affected within the
14 50 dBA L_{eq} (1 hour) construction noise contour. With these measures in place, indirect effects of
15 noise and visual disturbance from construction activities are not expected to reduce the greater
16 sandhill crane population in the study area.

17 The use of mechanical equipment during water conveyance facilities construction could cause the
18 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the
19 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater
20 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*
21 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that
22 measures were in place to prevent runoff from the construction area and negative effects of dust on
23 foraging habitat.

24 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
25 mercury in covered species, including greater sandhill crane. [Largemouth bass was used as a](#)
26 [surrogate species for analysis \(Appendix D, Substantive BDCP Revisions, in this](#)
27 [RDEIR/SDEIS Appendix D\)](#). [Results of the quantitative modeling of mercury effects on largemouth](#)
28 [bass as a surrogate species would overestimate the effects on greater sandhill crane. Organisms](#)
29 [feeding within pelagic-based \(algal\) food webs have been found to have higher concentrations of](#)
30 [methylmercury than those in benthic or epibenthic food webs; this has been attributed to food chain](#)
31 [length and dietary segregation \(Grimaldo et al. 2009\). Therefore, potential indirect effects of](#)
32 [increased mercury exposure is likely low for greater sandhill crane because they primarily forage on](#)
33 [cultivated crops. Modeled effects of mercury concentrations from changes in water operations](#)
34 [under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,](#)
35 [results also indicate that greater sandhill crane tissue concentrations would not measurably](#)
36 [increase as a result of CM1 implementation.](#)

37 [Marsh \(tidal and nontidal\) and floodplain restoration also have the potential to increase exposure to](#)
38 [methylmercury.](#) Mercury is transformed into the more bioavailable form of methylmercury in
39 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
40 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
41 bioavailability of mercury ([see BDCP Chapter 3, Conservation Strategy, for details of restoration](#)).
42 Increased methylmercury associated with natural community and floodplain restoration may
43 indirectly affect greater sandhill crane via uptake in lower trophic levels ([BDCP see Appendix 5.D,](#)
44 [Contaminants, of the Draft BDCP](#)). [Mercury is generally elevated throughout the Delta, and](#)
45 [restoration of the lower potential areas in total may result in generalized, very low level increases of](#)

1 mercury. Given that some species have elevated mercury tissue levels pre-BDCP, these low level
2 increases could result in some level of effects. In general, the highest methylation rates are
3 associated with high tidal marshes that experience intermittent wetting and drying and associated
4 anoxic conditions (Alpers et al. 2008). The potential mobilization or creation of methylmercury
5 within the study area varies with site-specific conditions and would need to be assessed at the
6 project level. CM12 Methylmercury Management includes provisions for project-specific Mercury
7 Management Plans. Along with avoidance and minimization measures and adaptive management
8 and monitoring, 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. The
10 potential indirect effects of increased mercury exposure is likely low for greater sandhill crane for
11 the following reasons: 1) greater sandhill cranes occur in the study area only during the
12 nonbreeding winter months, 2) their primary foraging habitats in the study area are cultivated
13 crops, and 3) the use of restored tidal wetlands by cranes is likely to be limited compared to
14 seasonal managed wetlands.

15 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
16 into the foodweb, CM12 Methylmercury Management, is included to provide for site-specific
17 evaluation for each restoration project. If a project is identified where there is a high potential for
18 methylmercury production that could not be fully addressed through restoration design and
19 adaptive management, alternate restoration areas would be considered. CM-12 would be
20 implemented in coordination with other similar efforts to address mercury in the Delta, and
21 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
22 would include the following actions.

- 23 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
24 mercury methylation and bioavailability
- 25 ● Define design elements that minimize conditions conducive to generation of methylmercury in
26 restored areas.
- 27 ● Define adaptive management strategies that can be implemented to monitor and minimize
28 actual postrestoration creation and mobilization of methylmercury.

29 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low
30 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf
31 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also
32 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The
33 effect of selenium toxicity differs widely between species and also between age and sex classes
34 within a species. In addition, the effect of selenium on a species can be confounded by interactions
35 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

36 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
37 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
38 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
39 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
40 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
41 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
42 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
43 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
44 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which

1 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic
2 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
3 levels of selenium have a higher risk of selenium toxicity.

4 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
5 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
6 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh
7 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
8 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
9 BDCP restoration activities that create newly inundated areas could increase bioavailability of
10 selenium (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration).
11 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality, of the Draft EIR/EIS*
12 and it was determined that, relative to Existing Conditions and the No Action Alternative, CM1
13 would not result in substantial, long-term increases in selenium concentrations in water in the Delta
14 under any alternative. However, it is difficult to determine whether the effects of potential increases
15 in selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)
16 would lead to adverse effects on greater sandhill crane.

17 Because of the uncertainty that exists at this programmatic level of review, there could be a
18 substantial effect on greater sandhill crane from increases in selenium associated with restoration
19 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
20 *Management* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix 3.C,](#)
21 [Avoidance and Minimization Measures](#)) which would provide specific tidal habitat restoration design
22 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
23 habitats. Furthermore, the effectiveness of selenium management to reduce selenium
24 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
25 part of design and implementation. This avoidance and minimization measure would be
26 implemented as part of the tidal habitat restoration design schedule.

27 [NEPA Effects: Crane habitat could potentially be affected by general construction noise above](#)
28 [baseline level \(50–60 dBA\). Construction in certain areas would take place 7 days a week and 24](#)
29 [hours a day and evening and nighttime construction activities would require the use of extremely](#)
30 [bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period](#)
31 [and by exposing them to predators. Effects of noise and visual disturbance could substantially alter](#)
32 [the suitability of habitat for greater sandhill crane. AMM20 Greater Sandhill Crane would include](#)
33 [requirements \(described above\) to minimize the effects of noise and visual disturbance on greater](#)
34 [sandhill cranes and to mitigate for affected habitat.](#)

35 [Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium](#)
36 [which could result in the potential mortality of a special-status species. This effect would be](#)
37 [addressed through the implementation of AMM27 Selenium Management, 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.](#)

40 [The implementation of tidal natural communities restoration or floodplain restoration could result](#)
41 [in increased exposure of greater sandhill crane to methylmercury. The potential indirect effects of](#)
42 [increased mercury exposure is likely low for greater sandhill crane because they primarily forage on](#)
43 [cultivated crops. Implementation of CM12 which contains measures to assess the amount of](#)
44 [mercury before project development, followed by appropriate design and adaptation management.](#)

1 would minimize the potential for increased methylmercury exposure, and would result in no
2 adverse effect on the species.

3 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise
4 ~~(13,421–43,125 acres) and pile driving (1,989–14,111 acres)~~ above baseline level (50–60 dBA).
5 Construction in certain areas would take place 7 days a week and 24 hours a day and evening and
6 nighttime construction activities would require the use of extremely bright lights, which could
7 adversely affect roosting cranes by impacting their sense of photo-period and by exposing them to
8 predators. ~~Effects of noise and visual disturbance could substantially alter the suitability of habitat~~
9 ~~for greater sandhill crane. This would be a significant impact. The effects of noise and visual~~
10 ~~disturbances would be reduced through the implementation of AMM20 Greater Sandhill Crane~~ ~~which~~
11 would include requirements (described above) to minimize the effects of noise and visual
12 disturbance on greater sandhill cranes and to mitigate for affected habitat.

13 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
14 which could result in the potential mortality of a special-status species. This would be a significant
15 impact. This effect would be addressed through the implementation of AMM27 Selenium
16 Management, which would provide specific tidal habitat restoration design elements to reduce the
17 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

18 ~~With these measures in place, in addition to AMM1–AMM7, noise and visual disturbances, potential~~
19 ~~spills of hazardous materials, increased dust and sedimentation, and operations and maintenance of~~
20 ~~the water conveyance facilities would have a less than significant impact on greater sandhill crane.~~
21 ~~Methylmercury tissue concentrations in greater sandhill cranes would not be expected to~~
22 ~~measurably increase as a result of water operations under CM1 compared to the No Action~~
23 ~~Alternative. The implementation of tidal natural communities restoration or floodplain restoration~~
24 ~~could result in increased exposure of greater sandhill crane to methylmercury. This would be a~~
25 ~~significant impact. The potential indirect effects of increased mercury exposure is likely low for~~
26 ~~greater sandhill crane for the following reasons: 1) greater sandhill cranes occur in the study area~~
27 ~~only during the nonbreeding winter months, 2) because their primary foraging habitats they~~
28 ~~primarily forage on in the study area are cultivated crops, and 3) the use of restored tidal wetlands~~
29 ~~by cranes is likely to be limited compared to seasonal managed wetlands. Implementation of CM12~~
30 ~~which contains measures to assess the amount of mercury before project development, followed by~~
31 ~~appropriate design and adaptation management, would minimize the potential for increased~~
32 ~~methylmercury exposure, and would result in no adverse effect on the species.~~

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 Methylmercury Management, would be~~
35 ~~available to address the uncertainty of methylmercury levels in restored tidal marsh and potential~~
36 ~~impacts on greater sandhill crane. Tidal habitat restoration could result in increased exposure of~~
37 ~~greater sandhill crane to selenium. This effect would be addressed through the implementation of~~
38 ~~AMM27 Selenium Management, which would provide specific tidal habitat restoration design~~
39 ~~elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal~~
40 ~~habitats. With these measures in place, the indirect effects of Alternative 4 implementation would~~
41 ~~have a less than significant impact on greater sandhill crane.~~

42 With AMM1-AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
43 under Alternative 4 would not substantially reduce the number or restrict the range of greater

1 sandhill cranes. Therefore, the indirect effects of Alternative 4 implementation would have a less-
2 than-significant impact on greater sandhill crane.

3 **Lesser Sandhill Crane**

4 This section describes the effects of Alternative 4, including water conveyance facilities construction
5 and implementation of other conservation components, on lesser sandhill crane. Lesser sandhill
6 cranes in the study area are almost entirely dependent on privately owned agricultural lands for
7 foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on providing a
8 matrix of compatible crop types that afford suitable foraging habitat and maintaining compatible
9 agricultural practices, while sustaining and increasing the extent of other essential habitat elements
10 such as night roosting habitat. The habitat model for lesser sandhill crane includes “roosting and
11 foraging” and “foraging” habitat. Suitable roosting and foraging habitat in the study area includes
12 certain agricultural types, specific grassland types, irrigated pastures and hay crops, managed
13 seasonal wetland, and other natural seasonal wetland. Roosting and foraging habitat includes
14 traditional roost sites that are known to be used by sandhill cranes (both greater and lesser) and
15 that also provide foraging habitat. Detail regarding the roosting and foraging modeled habitat for
16 both subspecies of sandhill crane is included in the BDCP (BDCP-see Appendix 2.A, Covered Species
17 Accounts, of the Draft BDCP). Both temporary and permanent roost sites were identified for sandhill
18 cranes. Permanent roosting and foraging sites are those used regularly, year after year, while
19 temporary roosting and foraging sites are those used in some years. Factors included in assessing
20 the loss of foraging habitat for the lesser sandhill crane considers the relative habitat value of
21 specific crop or land cover types. Although both the greater and the lesser Sandhill crane use similar
22 crop or land cover types, these provide different values of foraging habitat for the two subspecies
23 based on proportional use of these habitats. Lesser sandhill cranes are less traditional than greater
24 sandhill cranes and are more likely to move between different roost site complexes and different
25 wintering regions (Ivey pers. comm.) The wintering range is ten times larger than the greater
26 sandhill crane and their average foraging flight radius from roost sites is twice that of greater
27 sandhill cranes. Because of this higher mobility, lesser sandhill cranes are more flexible in their use
28 of foraging areas than the greater sandhill crane.

29 Construction and restoration associated with Alternative 4 conservation measures would result in
30 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as
31 indicated in Table 12-4-31. Full implementation of Alternative 4 would include the following
32 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP-see Chapter 3,
33 Section 3.3, Biological Goals and Objectives, of the Draft BDCP) that would also benefit the lesser
34 sandhill crane.

- 35 ● Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
36 least 80% maintained in very high-value types in any given year. This protected habitat will be
37 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
38 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
39 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
40 GSHC1.1, associated with CM3).
- 41 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
42 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
43 nonhabitat areas and converting it to high- or very high-value habitat. Created 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

1 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
2 habitat loss (Objective GSHC1.2, associated with CM3).

- 3 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
4 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
5 and local seasonal flood events. The wetlands will be located within 2 miles of existing
6 permanent roost sites and protected in association with other protected natural community
7 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
8 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 9 ● Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
10 project boundary. The complexes will be no more than 2 miles apart and will help provide
11 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
12 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
13 roosting habitat, and will be protected in association with other protected natural community
14 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
15 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
16 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
17 support roosting cranes and provide highest-value foraging habitat, provided such substitution
18 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
19 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 20 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
21 sites. The habitat will consist of active cornfields that are flooded following harvest to support
22 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
23 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
24 be sited with consideration of the location of roosting habitat loss and will be in place prior to
25 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 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 ● Target cultivated land conservation to provide connectivity between other conservation lands
32 (Objective CLNC1.2, associated with CM3).
- 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, water conveyance
35 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

36 As explained below, with the restoration and protection of these amounts of habitat, in addition to
37 natural community enhancement and management commitments (including *CM12 Methylmercury*
38 *Management* [as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS](#)) and
39 implementation of AMM1–AMM7, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management* ([as](#)
40 [revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS](#)), and *AMM30 Transmission*
41 *Line Design and Alignment Guidelines*, impacts on the lesser sandhill crane would be less than
42 significant for CEQA purposes, and would not be adverse for NEPA purposes.

1
2

Table 12-4-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	83	83	NA	NA
	Roosting and Foraging - Temporary	2916	2916	1685	1685	NA	NA
	Foraging	2,709 838	2,709 838	1,115 988	1,115 88	NA	NA
Total Impacts CM1		2,738 .854	2,738 .854	1,131 076	1,076 131		
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	12,172	2	4	0	0
Total Impacts CM2-CM18		3,610	12,172 213	2	4	0	0
Total Roosting and Foraging - Permanent		0	0	83	83		
Total Roosting and Foraging - Temporary		2916	7057	1685	1685		
Total Foraging		6,319 448	14,840 010	1,117 990	1,119 992		
TOTAL IMPACTS		6,348 464	14,910 067	1,133 078	1,080 135	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

1 Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill 2 Crane

3 Alternative 4 conservation measures would result in the combined permanent and temporary loss
4 of up to 94,145 acres of modeled roosting and foraging habitat (70,57 acres of permanent loss, 24,88
5 acres of temporary loss) and 15, 959,002 acres of foraging habitat (14, 840,010 acres of permanent
6 loss, 1,119,992 acres of temporary loss, Table 12-4-31). Conservation measures that would result in
7 these losses are conveyance facilities and transmission line construction, and establishment and use
8 of reusable tunnel material borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements
9 (CM2), Tidal Natural Communities Restoration (CM4), Seasonally Inundated Floodplain Restoration
10 (CM5), Grassland Natural Community Restoration (CM8), Nontidal Marsh Natural Community
11 Restoration (CM10), and Natural Communities Enhancement and Management (CM11). The
12 majority of habitat loss would result from water conveyance facility construction and conversion of
13 habitat to tidal natural communities through CM4. Habitat enhancement and management activities
14 through CM11, which include ground disturbance or removal of nonnative vegetation, could also
15 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
16 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
17 or eliminate lesser sandhill crane modeled habitat. Each of these individual activities is described
18 below. A summary statement of the combined impacts, NEPA effects and a CEQA conclusion follow
19 the individual conservation measure discussions.

- 20 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
21 facilities as they are currently designed would result in the combined permanent loss of up to
22 32,823,930 acres of modeled lesser sandhill crane habitat. This would consist of the permanent
23 removal of 29,16 acres of temporary roosting and foraging habitat, and 2,709,838 acres of
24 foraging habitat. Foraging habitat that would be permanently impacted by CM1 would consist of
25 2,261,049 acres of very high-value, 39,144 acres of high-value, and 372,325 acres of medium-
26 value foraging habitat (Table 12-4-32). In addition, 8,3 acres of permanent roosting and foraging
27 habitat, 16,85 acres of temporary roosting and foraging habitat, and 1,115,988 acres of foraging
28 habitat would be temporarily removed (Table 12-4-31). The temporarily removed habitat
29 would consist primarily of cultivated lands and it would be restored within 1 year following
30 construction. However, it would not necessarily be restored to its original topography and it
31 could be restored as grasslands. CM1 activities that would result in temporary impacts would
32 include temporary access roads, reusable tunnel material borrow and spoil sites, and work areas
33 for construction.

34 The acres of temporary and permanent roosting and foraging habitat that would be
35 permanently removed is located on Staten-Bouldin Island, Zacharias Island, Bouldin Island, and
36 Venice from the construction of a permanent access road. Temporary impacts on roosting and
37 foraging habitat would occur on Bouldin Island and the from the construction of a temporary
38 concrete batch plant and a fuel station. Temporary losses would also occur from the
39 construction of temporary transmission lines between the Lambert Road vent shaft and the
40 intermediate forebay, and on Venice Island. losses would be a result of installation of permanent
41 and temporary transmission lines and associated access roads. However, the implementation of
42 *AMM20 Greater Sandhill Crane* would require that CM1 activities be designed to avoid direct loss
43 of crane roost sites. This includes a provision that the final transmission line alignment would be
44 designed to avoid crane roost sites. Avoidance of crane roost sites would be accomplished either
45 by siting activities outside of identified roost sites or by relocating the roost site if it consisted of
46 cultivated lands (roost sites consisting of wetlands would not be subject to re-location).

1 Relocated roost sites would be established prior to construction activities affecting the original
2 roost site (as described ~~in for~~ *AMM20 Greater Sandhill Crane*, *BDCP-Appendix 3.C, Avoidance and*
3 *Minimization Measures, of the Draft BDCP*). Therefore there would be no loss of crane roosting
4 and foraging habitat as a result of water conveyance facility construction once the facilities were
5 fully designed.

6 Approximately ~~21,347-480~~ acres of the permanent loss of foraging habitat would be from the
7 storage of reusable tunnel material. This material would ~~be stored on Bouldin Island, Zacharias~~
8 ~~Island and parcels south of Lambert Road and north of the Cosumnes River. The reusable tunnel~~
9 ~~material would~~ likely be moved to other sites for use in levee build-up and restoration, and the
10 affected areas would likely eventually be restored. ~~While this-This~~ effect is categorized as
11 permanent because there is no assurance that the material would eventually be moved, ~~the~~
12 ~~effect would likely be temporary. The actual footprint of the storage areas required for reusable~~
13 ~~tunnel material is flexible, and the actual acreage of habitat affected by this activity could be~~
14 ~~reduced based on the height of the storage piles in addition to other considerations.~~ The
15 implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged*
16 *Material*, would require that the areas used for reusable tunnel material storage be minimized in
17 crane foraging habitat and completely avoid crane roost sites.

18 ~~Approximately 1,257 acres of the foraging habitat permanently lost from storage of reusable tunnel~~
19 ~~material would be on Staten Island, which is among the most significant crane use areas in the Delta~~
20 ~~(Littlefield and Ivey 2000). As described above, AMM6 would require that the actual footprint of this~~
21 ~~impact be minimized in crane foraging habitat. Specifically, AMM6 would require that reusable~~
22 ~~tunnel material storage on Staten Island be sized and located in coordination with greater sandhill~~
23 ~~crane experts, USFWS, and CDFW, which would reduce potential effects on both greater and lesser~~
24 ~~sandhill cranes. AMM20 Greater Sandhill Crane includes specific measures to reduce potential effects~~
25 ~~of construction on sandhill cranes on Staten Island.~~ Refer to the Terrestrial Biology Map ~~B~~ook in
26 ~~Appendix A of this RDEIR/SDEIS~~ for a detailed view of Alternative 4 construction locations. Impacts
27 from CM1 would occur within the first 10-~~14~~ years of Alternative 4 implementation.

1 **Table 12-4-32. Value of Lesser Sandhill Crane Foraging Habitat Affected By Alternative 4**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2-CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	2,261 1,049 (367 448)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	39 144 (132 43)	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	372 325 (276 245)	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)	25 292 (311 244)	3,745 (2)
None	Vineyards, orchards	12 28 (29 8)	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.
- 6 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
- 7 footprint, this activity would result in the permanent loss or conversion of approximately
- 8 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and
- 9 foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would
- 10 consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value,
- 11 and 2,983 acres of low-value foraging habitat (Table 12-4-32). Habitat loss would primarily
- 12 occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4
- 13 could occur between the high crane use areas of the central Delta and the Cosumnes River
- 14 Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would
- 15 not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less
- 16 traditional than greater sandhill cranes and would be more adaptable to changes in land use.
- 17 Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of
- 18 Alternative 4 implementation.
- 19 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in
- 20 the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1
- 21 acres of temporary loss). This impact would occur after the first 10 years of Alternative 4
- 22 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 Alternative 4
13 implementation.
- 14 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
15 actions included in *CM11* that are designed to enhance wildlife values in restored or protected
16 habitats could result in localized ground disturbances that could temporarily remove small
17 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
18 vegetation and road and other infrastructure maintenance activities, would be expected to have
19 minor adverse effects on available habitat and would be expected to result in overall
20 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
21 these activities to result in direct mortality of lesser sandhill crane would be minimized with the
22 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of
23 recreational-related facilities including trails, interpretive signs, and picnic tables ([BDCP-see](#)
24 [Chapter 4, Covered Activities and Associated Federal Actions, of the Draft BDCP](#)). The construction
25 of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on
26 existing, disturbed areas when and where possible. If new ground disturbance was necessary,
27 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of
28 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of
29 Alternative 4 implementation).
- 30 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
31 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
32 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance
33 activities would include vegetation management, levee and structure repair, and re-grading of
34 roads and permanent work areas. These effects, could be adverse as sandhill cranes are
35 sensitive to disturbance. However, potential impacts would be reduced by AMMs and
36 conservation actions as described below.
- 37 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
38 direct mortality of lesser sandhill crane if they were present in the study area, because they
39 would be expected to avoid contact with construction and other equipment. Potential effects
40 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
41 Injury and mortality from electrical transmission facilities are described below under Impact
42 BIO-73.

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 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,
6 Alternative 4 would remove ~~53-104~~ acres roosting and foraging habitat (~~29-16~~ acres of permanent
7 loss, ~~24-88~~ acres of temporary loss) in the study area in the near-term. These effects would result
8 from the construction of the water conveyance facilities (CM1, ~~53-104~~ acres). In addition, ~~76,436~~
9 ~~438~~ acres of foraging habitat would be removed or converted in the near-term (CM1, ~~32,824-826~~
10 acres; *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*,
11 and *CM11 Natural Communities Enhancement and Management*—3,612 acres). Of these near-term
12 acres of foraging habitat impacted, ~~54,953-760~~ acres would be medium- to very high-value habitat
13 (CM1, ~~32,447-253~~ 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 ~~53-104~~ acres of lesser sandhill crane roosting habitat
17 should be restored/created and ~~53-104~~ acres should be protected to compensate for the CM1 losses
18 of lesser sandhill crane ~~permanent and temporary~~ roosting and foraging habitat. In addition, ~~32,447~~
19 ~~253~~ acres of high- to very high-value foraging habitat should be protected to mitigate the CM1 losses
20 of lesser sandhill crane medium- to very high-value foraging habitat. The near-term effects of other
21 conservation actions would remove 2,507 acres of medium- to very high-value foraging habitat, and
22 therefore require 2,507 acres of protection of high- to very high-value foraging habitat using the
23 same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and
24 foraging habitat; 1:1 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 ~~53-104~~ acres of roosting and foraging habitat once the project design is
30 final. 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 ([see](#) Table 3-4 in Chapter 3, *Description*
34 *of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM10
35 and would occur in the same timeframe as 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 (see Draft BDCP Chapter 3, Figure 3.3-6) and would be designed to
 10 provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations
 11 (Objective GSHC1.4) which would also benefit lesser sandhill crane. These wetlands would consist of
 12 two 90-acre wetland complexes each consisting of at least three wetlands and would be no more
 13 than 2 miles apart. One of the 90-acre wetland complexes created under this objective could be
 14 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
 15 support roosting cranes and provide highest-value foraging habitat, provided such substitution is
 16 consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for greater
 17 sandhill crane. The large patch sizes of these wetland complexes would provide additional
 18 conservation to address the threats of vineyard conversion, urbanization to the east, and sea level
 19 rise to the west of 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 would be available to guide the near-term protection of cultivated lands to ensure that the
 23 near-term impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
 24 compensated for with appropriate crop types and natural communities [described in Table 12-4-32.](#)

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
 32 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
 33 *[RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

34 **Late Long-Term Timeframe**

35 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
 36 acres of foraging habitat for lesser sandhill crane. Alternative 4 as a whole would result in the
 37 permanent loss of and temporary effects on [94,145](#) acres of roosting and foraging habitat ([70-57](#)
 38 [acres of permanent loss, 24-88](#) acres of temporary loss) and 15,[959-002](#) acres of foraging habitat
 39 ([14,840-010](#) acres of permanent loss, [1,119,992](#) acres of temporary loss) for the lesser sandhill crane
 40 during the term of the Plan. The foraging habitat lost by the late long-term timeframe would consist
 41 of [1110,809-616](#) acres of medium- to very high-value foraging habitat. The locations of these losses
 42 are described above in the analyses of individual conservation measures. The implementation of
 43 *AMM20 Greater Sandhill Crane* would require that no crane roost sites were directly affected by
 44 water conveyance facilities including transmission lines and associated footprints. In addition,
 45 temporarily removed habitat would be restored within 1 year following construction. However, it

1 would not necessarily be restored to its original topography and it could result in the conversion of
2 cultivated lands to grasslands.

3 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
4 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
5 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
6 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
7 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

8 The BDCP also includes the following objectives for the greater sandhill crane which would also
9 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
10 winter use areas.

11 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
12 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
13 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
14 and local seasonal flood events. These wetlands would be created within 2 miles of existing
15 permanent roost sites and protected in association with other protected natural community types at
16 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
17 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
18 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
19 constructed within the Stone Lakes NWR project boundary ([see Draft BDCP Chapter 3, Figure 3.3-6](#))
20 and would be designed to provide connectivity between the Stone Lakes and Cosumnes greater
21 sandhill crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre
22 wetland complexes each consisting of at least three wetlands and would be no more than 2 miles
23 apart. One of the 90-acre wetland complexes created under this objective could be replaced by 180
24 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting
25 cranes and provide highest-value foraging habitat, provided such substitution is consistent with the
26 long-term conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The
27 large patch sizes of these wetland complexes would provide additional conservation to address the
28 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
29 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
30 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
31 active cornfields that are flooded following harvest to support roosting cranes and also provide the
32 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
33 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
34 consideration of the location of roosting habitat loss and would be in place prior to construction
35 activities.

36 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
37 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
38 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
39 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The patch size of these
40 protected lands would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural
41 habitat values change over time based largely on economically driven agricultural practices,
42 protecting crane habitat would provide enhanced stability to agricultural habitat value within the
43 crane use area that does not currently exist. Although lesser sandhill cranes are less traditional in
44 their use of roost sites in the Delta, these objectives for the greater sandhill crane would also benefit
45 the lesser sandhill crane.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
8 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
9 *[RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

10 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential direct mortality of this special-
11 status species under Alternative 4 would represent an adverse effect in the absence of other
12 conservation actions. However, with habitat protection and restoration associated with *CM3 Natural*
13 *Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by biological
14 goals and objectives for the species and by AMM1–AMM7 and *AMM20 Greater Sandhill Crane*, which
15 would be in place ~~during all project activities throughout the construction period~~, and with
16 implementation of Mitigation Measure BIO-72, which would be available to compensate for loss of
17 medium- to very high-value foraging habitat, the effects of habitat loss and potential mortality on
18 lesser sandhill crane would not be adverse under Alternative 4.

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. Based on current design
25 footprints, Alternative 4 would remove ~~53-104~~ acres roosting and foraging habitat (~~29-16~~ acres of
26 permanent loss, ~~24-88~~ acres of temporary loss) in the study area in the near-term. These effects
27 would result from the construction of the water conveyance facilities (CM1, ~~53-104~~ acres). In
28 addition, ~~76,436-438~~ acres of foraging habitat would be removed or converted in the near-term
29 (CM1, ~~32,824-826~~ acres; *CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural*
30 *Community Restoration, and CM11 Natural Communities Enhancement and Management*—3,612
31 acres). Of these near-term acres of foraging habitat impacted, ~~5,953-4,760~~ acres would be medium-
32 to very high-value habitat (CM1, ~~32,447-253~~ acres, CM2-11, 2,507 acres).

33 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
34 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
35 habitat. Using these ratios would indicate that ~~153-04~~ acres of lesser sandhill crane roosting habitat
36 should be restored/created and ~~53-104~~ acres should be protected to compensate for the CM1 losses
37 of lesser sandhill crane roosting and foraging habitat. In addition, ~~32,447-253~~ acres of high- to very
38 high-value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane
39 medium- to very high-value foraging habitat. The near-term effects of other conservation actions
40 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require
41 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA
42 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
43 protection for the loss of foraging habitat).

1 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
2 sites were directly impacted by CM1 covered activities (including transmission lines and their
3 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
4 result of water conveyance facility construction once the facilities were fully designed, which would
5 avoid the CM1 impact on 53 acres of roosting and foraging habitat once the project design is final.
6 Indirect effects of construction-related noise and visual disturbance are discussed below under
7 Impact BIO-74.

8 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
9 protecting 15,600 acres of cultivated lands in the Plan Area ([see](#) Table 3-4 in Chapter 3, *Description*
10 *of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM10
11 and would occur in the same timeframe as the construction and early restoration losses.

12 The BDCP also includes the following objectives for the greater sandhill crane which would also
13 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
14 winter use areas.

15 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
16 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
17 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
18 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
19 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
20 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
21 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
22 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
23 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
24 events. These wetlands would be created within 2 miles of existing permanent roost sites and
25 protected in association with other protected natural community types at a ratio of 2:1 upland to
26 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
27 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
28 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
29 Lakes NWR project boundary ([see Draft](#) BDCP Chapter 3, Figure 3.3-6) and would be designed to
30 provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations
31 (Objective GSHC1.4) which would also benefit lesser sandhill crane. These wetlands would consist of
32 two 90-acre wetland complexes each consisting of at least three wetlands and would be no more
33 than 2 miles apart. One of the 90-acre wetland complexes created under this objective could be
34 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
35 support roosting cranes and provide highest-value foraging habitat, provided such substitution is
36 consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for greater
37 sandhill crane. The large patch sizes of these wetland complexes would provide additional
38 conservation to address the threats of vineyard conversion, urbanization to the east, and sea level
39 rise to the west of sandhill crane wintering habitat.

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](#)
45 [minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are](#)

1 described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
2 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
3 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

4 In the absence of other conservation actions, the effects on lesser sandhill crane habitat from
5 Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status
6 species and potential for direct mortality. At least 15,600 acres of cultivated lands that provide
7 habitat for covered and other native wildlife species would be protected in the near-term time
8 period (Objective CLNC1.1). Mitigation Measure BIO-72 would be available to guide the near-term
9 protection of cultivated lands to ensure that the near-term impacts of medium- to very high-value
10 foraging habitat for lesser sandhill crane were compensated for with appropriate crop types and
11 natural communities. Considering the conservation actions described above, and AMMs 1-7 and
12 AMM20, Alternative 4, over the term of the BDCP would not result in a substantial adverse effect
13 through habitat modifications and would not substantially reduce the number or restrict the range
14 of greater sandhill cranes. Therefore, Alternative 4 would have a less-than-significant impact on
15 lesser sandhill cranes. No mitigation would be required.

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 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
25 acres of foraging habitat for lesser sandhill crane. Alternative 4 as a whole would result in the
26 permanent loss of and temporary effects on 94,145 acres of roosting and foraging habitat (70-57
27 acres of permanent loss, 24-88 acres of temporary loss) and 15,959-002 acres of foraging habitat
28 (14,840-010 acres of permanent loss, 1,119,992 acres of temporary loss) for the lesser sandhill crane
29 during the term of the Plan. The foraging habitat lost by the late long-term timeframe would consist
30 of 110,809-616 acres of medium- to very high-value foraging habitat. The locations of these losses
31 are described above in the analyses of individual conservation measures. The implementation of
32 *AMM20 Greater Sandhill Crane* would require that no crane roost sites were directly affected by
33 water conveyance facilities including transmission lines and associated footprints. In addition,
34 temporarily removed habitat would be restored within 1 year following construction. However, it
35 would not necessarily be restored to its original topography and it could result in the conversion of
36 cultivated lands to grasslands.

37 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
38 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
39 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
40 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
41 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

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 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 ([see Draft BDCP Chapter 3, Figure 3.3-6](#))
 10 and would be designed to provide connectivity between the Stone Lakes and Cosumnes greater
 11 sandhill crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre
 12 wetland complexes each consisting of at least three wetlands and would be no more than 2 miles
 13 apart. One of the 90-acre wetland complexes created under this objective could be replaced by 180
 14 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting
 15 cranes and provide highest-value foraging habitat, provided such substitution is consistent with the
 16 long-term conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The
 17 large patch sizes of these wetland complexes would provide additional conservation to address the
 18 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
 19 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
 20 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
 21 active cornfields that are flooded following harvest to support roosting cranes and also provide the
 22 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
 23 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
 24 consideration of the location of roosting habitat loss and would be in place prior to construction
 25 activities.

26 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
 27 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
 28 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
 29 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The patch size of these
 30 protected lands would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural
 31 habitat values change over time based largely on economically driven agricultural practices,
 32 protecting crane habitat would provide enhanced stability to agricultural habitat value within the
 33 crane use area that does not currently exist. Although lesser sandhill cranes are less traditional in
 34 their use of roost sites in the Delta, these objectives for the greater sandhill crane would also benefit
 35 the lesser sandhill crane.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 43 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 44 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

45 [In the absence of other conservation actions, the effects on greater sandhill crane habitat from](#)
 46 [Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status](#)

1 species and potential for direct mortality. Considering Alternative 4's protection and restoration
2 provisions, in addition to Mitigation Measure BIO-72, which would compensate for the loss of
3 medium- to very high-value foraging habitat at a ratio of 1:1, loss of habitat or direct mortality
4 through implementation of Alternative 4 would not result in a substantial adverse effect through
5 habitat modifications and would not substantially reduce the number or restrict the range of the
6 species. Therefore, the alternative would have a less-than-significant impact on lesser sandhill
7 crane.

8 **Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value** 9 **Lesser Sandhill Crane Foraging Habitat**

10 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging
11 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
12 Area. Compensation must occur prior to or concurrent with the impacts, to minimize the effects
13 of habitat loss. The crop types and natural communities that are included in foraging value
14 categories are listed in Table 12-4-32. Foraging habitat conservation must occur within 10
15 kilometers of traditional sandhill crane roost sites and the location of protected habitat or
16 conservation easements must be preapproved by CDFW.

17 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission** 18 **Facilities**

19 Sandhill cranes are susceptible to collision with power lines and other structures during periods of
20 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and
21 Drewien 1995, Manville 2005). There are extensive existing transmission and distribution lines in
22 the sandhill crane winter use area. These include a network of distribution lines that are between
23 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area, one that overlaps
24 with the greater sandhill crane winter use area between Antioch and I-5 east of Hood, and one that
25 crosses the northern tip of the crane winter use area north of Clarksburg. There are 69-kV lines
26 within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road, and the Southern
27 Pacific Dredge Cut in the vicinity of Stone Lakes National Wildlife Refuge. At the south end of the
28 winter use area, there are three 230-kV transmission lines that follow I-5, and then cut southwest
29 through Holt, and two 500-kV lines cross the southwestern corner of the winter use area. This
30 existing network of power lines in the study currently poses a collision and electrocution risk for
31 sandhill cranes, because they cross over or surround sandhill crane roost sites in the study area.

32 Both permanent and temporary electrical transmission lines would be constructed to supply
33 construction and operational power to Alternative 4 facilities, as described below. The potential
34 mortality of greater sandhill crane in the area of the proposed transmission lines was estimated for
35 the Draft BDCP using collision mortality rates developed by Brown and Drewien (1995) and an
36 estimate of potential crossings along the proposed lines (See Draft BDCP Appendix 5J.C, *Analysis of*
37 *Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis concluded that mortality risk
38 could be substantially reduced by marking new transmission lines to increase their visibility to
39 sandhill cranes. Mortality risk would be similarly reduced for lesser sandhill cranes by marking new
40 transmission lines.

41 The transmission line footprint for Alternative 4 was changed substantially from the Draft BDCP to
42 reduce potential risk of greater sandhill crane collisions. The following changes also reduce
43 potential risk of lesser sandhill crane collisions:

1 Alternative 4 substantially reduced the length of permanent and temporary transmission lines as
2 compared to the Draft BDCP, substantially reducing the likelihood of crane collisions. Under
3 Alternative 4, no permanent transmission lines would be constructed within the greater sandhill
4 crane winter use area. In addition, no new transmission lines (permanent or temporary) would be
5 constructed in the vicinity of Staten Island which is one of the most important wintering sites for
6 greater sandhill cranes in the Delta. The Alternative 4 transmission line alignment within the greater
7 sandhill crane winter use area would be limited to three segments of temporary transmission lines:
8 a temporary 11-mile segment extending north and south between Intake 2 and the intermediate
9 forebay, a temporary 9-mile segment extending east and west between the intermediate forebay
10 and the SMUD/WAPA substation, and an 11-mile segment extending north and south between
11 Bouldin Island and Victoria Island. These three temporary lines would be removed after
12 construction of the water conveyance facilities, after 10–14 years. Limiting the proposed
13 transmission line footprint to temporary lines and siting these lines away from the highest use areas
14 by both greater and lesser sandhill cranes, substantially reduces the potential for sandhill crane bird
15 strike in Alternative 4 as compared to the Draft BDCP.

16 In addition, after the BDCP Draft EIR/EIS was issued in December of 2013, additional avoidance
17 features were added to *AMM20 Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that
18 Alternative 4 meets the performance standard of no mortality of greater sandhill crane associated
19 with the new facilities. This would be achieved by implementing one or any combination of the
20 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating
21 or undergrounding existing lines where feasible; (3) using natural gas generators in lieu of installing
22 transmission lines in high-risk zones of the greater sandhill crane winter use area (4)
23 undergrounding new lines in high-risk zones of the greater sandhill crane winter use area, (5)
24 permanently installing flight diverters on existing lines over lengths equal to or greater than the
25 length of the new temporary transmission lines in the crane winter use area; and/or (6) for areas
26 outside of the Stone Lakes National Wildlife Refuge project boundary, shifting locations of flooded
27 areas that provide crane roosts to lower risk areas. These measures are described in detail in
28 *AMM20 Greater Sandhill Crane* (Appendix D, *Substantive BDCP Revisions*, of this RDEIR/SDEIS).

29 The implementation of the measures described above under *AMM20 Greater Sandhill Crane*, in
30 addition to the project design changes to avoid high crane use areas, would substantially reduce
31 potential collisions of lesser sandhill cranes with transmission lines. Potential measures include
32 using natural gas generators in lieu of transmission lines or undergrounding new lines in high-risk
33 zones in the greater sandhill crane winter use area. Marking transmission lines with flight diverters
34 that make the lines more visible to birds has been shown to dramatically reduce the incidence of
35 bird mortality, including for sandhill cranes (Brown and Drewien 1995). Yee (2008) estimated that
36 marking devices in the Central Valley could reduce avian mortality by 60%. All new temporary
37 transmission lines would be fitted with flight diverters. The installation of flight diverters on existing
38 permanent lines would be prioritized in the highest risk zones for greater sandhill crane (as
39 described in Draft BDCP Appendix 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*
40 *Powerlines*) and diverters would be installed in a configuration that research indicates would reduce
41 bird strike risk by at least 60%. Diverters would be installed on existing lines at a rate of one foot of
42 existing transmission line for every one foot of new project transmission line constructed, in an area
43 with equal or higher greater sandhill crane bird strike risk. Placing diverters on existing lines would
44 be expected to reduce existing lesser and greater sandhill crane mortality in the Plan Area and
45 therefore result in a net benefit to the lesser sandhill crane population because these flight diverters
46 would be maintained in perpetuity. Sandhill cranes are susceptible to collision with power lines and

1 other structures during periods of inclement weather and low visibility (Avian Power Line
 2 Interaction Committee 1994, Brown and Drewien 1995, Manville 2005). New transmission lines
 3 installed in the study area would increase the risk for bird power line strikes, which could result in
 4 injury or mortality of lesser sandhill cranes. Both permanent and temporary electrical transmission
 5 lines would be constructed to supply construction and operational power to BDCP facilities.
 6 Typically, higher-voltage (230-kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub”
 7 transmission (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006).
 8 The Alternative 4 alignment would require the installation of both permanent and temporary
 9 transmission lines extending north and south through much of the crane use area. In addition, a
 10 transmission line would be constructed between the cities of Hood and Locke eastward toward SR
 11 99 which would require the installation of approximately 17 miles of permanent transmission line
 12 (10 miles of 230-kV line and 7 miles of 69-kV line) and approximately 46 miles (21 miles of 230-kV
 13 line and 25 miles of 69-kV line) of temporary transmission lines. Temporary lines would be
 14 removed after construction of the water conveyance facilities, within 10 years.

15 Existing transmission lines in the sandhill crane winter use area include a network of distribution
 16 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with
 17 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of
 18 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,
 19 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes
 20 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV
 21 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross
 22 the southwestern corner of the winter use area. This existing network of power lines in the study
 23 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or
 24 surround sandhill crane roost sites in the study area. New transmission lines would increase this
 25 risk and have an adverse effect on the species in the absence of other conservation actions.

26 As described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
 27 *BDCP Powerlines, of the Draft BDCP*, the potential mortality of greater sandhill crane in the area of
 28 the proposed transmission lines was estimated using collision mortality rates by Brown and
 29 Drewien (1995) and an estimate of potential crossings along the proposed lines. Results indicate
 30 that in the absence of any line marking to increase visibility and reduce collision risk (i.e., without
 31 minimization measures), the average annual mortality of greater sandhill crane at permanent lines
 32 would be up to 18 fatalities per year and would be 120 fatalities per year at temporary lines. Lesser
 33 sandhill cranes use the same roost sites as greater sandhill cranes. However, their numbers fluctuate
 34 greatly over the season as they are more mobile and use a broader landscape than greater sandhill
 35 cranes. Although the roost population sizes would fluctuate more for lesser sandhill cranes, one
 36 could expect that proportionally, the total number of potential fatalities for the lesser sandhill crane
 37 would be similar to those of the greater sandhill crane.

38 Marking transmission lines with devices that make the lines more visible to birds has been shown to
 39 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and
 40 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality
 41 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual
 42 mortality rate is estimated to decrease to 7 fatalities per year for the permanent lines and, 41
 43 fatalities per year for the temporary lines.

44 The current proposed transmission line alignment under Alternative 4 is not fully designed, and line
 45 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the

1 final transmission line alignment would not result in a net increase in bird strike risk to greater
 2 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the
 3 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating
 4 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter
 5 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,
 6 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be
 7 expected to reduce existing mortality of both greater and lesser sandhill cranes in the study area.
 8 Designing the alignment to minimize risk and removing, relocating, or undergrounding existing lines
 9 would be given priority out of the above methods. With these measures, and considering that the
 10 temporary lines would be removed within the first 10 years of Alternative 4 implementation, the
 11 risk of lesser sandhill crane mortality from transmission lines would be reduced substantially.

12 ***NEPA Effects:*** Sandhill cranes are known to be susceptible to collision with overhead wires. The
 13 existing network of power lines in the study area currently poses a risk for lesser sandhill cranes.
 14 Under Alternative 4, proposed transmission lines have been designed to substantially reduce the
 15 likelihood of a crane collision with transmission lines. New transmission lines constructed as part of
 16 the project would be limited to temporary lines which would be removed within the first 10–14
 17 years of Alternative 4 implementation. In addition, no new transmission lines would be sited in the
 18 vicinity of Staten Island, which has high use by wintering lesser sandhill cranes. All new
 19 transmission lines constructed as a result of the project would be fitted with bird diverters, which
 20 have been shown to reduce avian mortality by 60%. By incorporating one or a combination of the
 21 measures to greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*,
 22 described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines
 23 under Alternative 4 would not result in an adverse effect on lesser sandhill crane. Sandhill cranes are
 24 known to be susceptible to collision with overhead wires. The existing network of power lines in the
 25 study area currently poses a risk for sandhill cranes. New transmission lines would increase the risk
 26 for bird power line strikes, which could result in injury or mortality of lesser sandhill cranes. By
 27 incorporating line marking devices on new transmission lines the estimated mortality rate for the
 28 greater sandhill crane would be 7 fatalities per year from permanent transmission lines and 41
 29 fatalities per year from temporary transmission lines, and similar mortality rates would be expected
 30 for lesser sandhill cranes. The current proposed transmission line alignment under Alternative 4 is
 31 not fully designed, and line locations are not final. The implementation of *AMM20 Greater Sandhill*
 32 *Crane* would require that the final transmission line alignment avoided crane roost sites and
 33 achieved no net increase of greater sandhill crane strike risk in the Plan Area. Measures to achieve
 34 this would also substantially reduce lesser sandhill crane strike risk. With *AMM20 Greater Sandhill*
 35 *Crane*, and considering that the temporary lines would be removed within the first 10 years of
 36 Alternative 4 implementation, the risk of mortality from collision with transmission lines would not
 37 result in an adverse effect on the lesser sandhill crane population.

38 ***CEQA Conclusion:*** Sandhill cranes are known to be susceptible to collision with overhead wires. The
 39 existing network of power lines in the study area currently poses a risk for lesser sandhill cranes.
 40 Under Alternative 4, proposed transmission lines have been designed to substantially reduce the
 41 likelihood of a crane collision with transmission lines. New transmission lines constructed as part of
 42 the project would be limited to temporary lines which would be removed within the first 10–14
 43 years of Alternative 4 implementation. In addition, no new transmission lines would be sited in the
 44 vicinity of Staten Island, which has high use by wintering lesser sandhill cranes. All new
 45 transmission lines constructed as a result of the project would be fitted with bird diverters, which
 46 have been shown to reduce avian mortality by 60%. By incorporating one or a combination of the

1 ~~measures to greatly reduce the risk of bird strike described in AMM20 Greater Sandhill Crane,~~
2 ~~described in AMM20 Greater Sandhill Crane, the construction and operation of transmission lines~~
3 ~~under Alternative 4 would have a less-than-significant impact on lesser sandhill crane. Sandhill~~
4 ~~cranes are known to be susceptible to collision with overhead wires. The existing network of power~~
5 ~~lines in the study area currently poses a risk for sandhill cranes. New transmission lines would~~
6 ~~increase the risk for bird-power line strikes, which could result in injury or mortality of greater~~
7 ~~sandhill crane. By incorporating line-marking devices on new transmission lines the estimated~~
8 ~~mortality rate would be 7 fatalities per year from permanent transmission lines and 41 fatalities per~~
9 ~~year from temporary transmission lines. A similar mortality rate would be expected for lesser~~
10 ~~sandhill crane. The current proposed transmission line alignment under Alternative 4 is not fully~~
11 ~~designed, and line locations are not final. The implementation of AMM20 Greater Sandhill Crane~~
12 ~~would require that the final transmission line alignment avoided crane roost sites and achieved no~~
13 ~~net increase of greater sandhill crane strike risk in the Plan Area. Measures to achieve this would~~
14 ~~also substantially reduce lesser sandhill crane strike risk. With AMM20 Greater Sandhill Crane, and~~
15 ~~considering that the temporary lines would be removed within the first 10 years of Alternative 4~~
16 ~~implementation, the risk of mortality from collision with transmission lines would~~
17 ~~substantially underresult in a less-than-significant impact on the lesser sandhill crane population.~~

18 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

19 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.
20 Noise and visual disturbances from the construction of water conveyance facilities and other
21 conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to work
22 areas. Indirect effects associated with construction include noise, dust, and visual disturbance
23 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
24 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
25 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
26 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These
27 effects could result from periodic vehicle use along the conveyance corridor, inspection and
28 maintenance of aboveground facilities, and similar activities. These potential effects would be
29 minimized with implementation of AMM20 Greater Sandhill Crane described in [BAppendix D,](#)
30 [Substantive BDCP Revisions, of this RDEIR/SDEIS](#) [DCP Appendix 3.C, Avoidance and Minimization](#)
31 [Measures.](#)

32 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
33 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
34 crane ([BDCP see Appendix 5.J, Attachment 5J.D, Indirect Effects of the Construction of the BDCP](#)
35 [Conveyance Facility on Sandhill CraneD, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)). The
36 analysis addressed the potential noise effects on cranes, and concluded that as much as [20,243](#)
37 [13,421–43,125](#) acres of crane habitat could potentially be affected by general construction noise
38 [\(including pile driving\)](#) above baseline level (50–60 dBA; [Table 12-4-30](#)). This would include [666–](#)
39 [3,2741,008](#) acres of permanent crane roosting habitat, [1,498–5,036909](#) acres of temporary crane
40 roosting habitat, and [11,258–34,81617,327](#) acres of crane foraging habitat. ~~In addition, 120–668~~
41 ~~acres of permanent crane roosting habitat, 477–1,562 acres of temporary crane roosting habitat,~~
42 ~~and 1,392–11,882 acres of crane foraging habitat could be affected by noise from pile driving that~~
43 ~~would be above baseline level (50–60 dBA, Table 12-4-30 under Impact BIO-71).~~ The analysis was
44 conducted based on the assumption that there would be direct line-of-sight from sandhill crane
45 habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In

1 many areas the existing levees would partially or completely block the line-of-sight and would
 2 function as effective noise barriers, substantially reducing noise transmission. However, there is
 3 insufficient data to assess the effects that increased noise levels would have on sandhill crane
 4 behavior. Similar acreages of lesser sandhill crane habitat would be expected to be indirectly
 5 affected. However, lesser sandhill cranes are less traditional in their winter roost sites and may be
 6 more likely to travel away from disturbed areas to roost and forage in more suitable habitat.

7 Evening and nighttime construction activities would require the use of extremely bright lights.
 8 Nighttime construction could also result in headlights flashing into roost sites when construction
 9 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
 10 the use of safety lights that would alert low-flying aircraft to the presence of these structures
 11 because of their height. Little data is available on the effects of impact of artificial lighting on
 12 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
 13 to flush and it is thought that they may avoid roosting in areas where lighting is bright ([BDCP-see](#)
 14 [Chapter 5, Effects Analysis, of the Draft BDCP](#)). If the birds were to roost in a brightly lit site, they
 15 may be vulnerable to sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual
 16 impacts from lighting include a reduction in the cranes' quality of nocturnal rest, and effects on their
 17 "sense of photo-period which might cause them to shift their physiology towards earlier migration
 18 and breeding." ([BDCP-see](#) [Chapter 5, Effects Analysis, of the Draft BDCP](#)). Effects such as these could
 19 prove detrimental to the cranes' overall fitness and reproductive success (which could in turn have
 20 population-level impacts). A change in photo-period interpretation could also cause cranes to fly out
 21 earlier from roost sites to forage and might increase their risk of power line collisions if they were to
 22 leave roosts before dawn ([BDCP-see](#) [Chapter 5, Effects Analysis, of the Draft BDCP](#)).

23 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the
 24 implementation of AMM20 ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~BDCP~~
 25 ~~Appendix 3.C, Avoidance and Minimization Measures~~). Activities within 0.75 mile of crane roosting
 26 habitat would reduce construction noise during night time hours (from one hour before sunset to
 27 one hour after sunrise) such that construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the
 28 nearest temporary or permanent roosts during periods when the roost sites are available (flooded).
 29 In addition, the area of crane foraging habitat that would be affected during the day (from one hour
 30 after sunrise to one hour before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour) would
 31 also be minimized. Unavoidable noise related effects would be compensated for by the enhancement
 32 of 0.1 acre of foraging habitat for every acre indirectly affected within the 50 dBA L_{eq} (1 hour)
 33 construction noise contour. With these measures in place, indirect effects of noise and visual
 34 disturbance from construction activities are not expected to reduce the lesser sandhill crane
 35 population in the study area.

36 The use of mechanical equipment during water conveyance facilities construction could cause the
 37 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the
 38 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser
 39 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*
 40 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure
 41 that measures were in place to prevent runoff from the construction area and negative effects of
 42 dust on foraging habitat.

43 **Methylmercury Exposure:** [Covered activities have the potential to exacerbate bioaccumulation of](#)
 44 [mercury in lesser sandhill cranes. Largemouth bass was used as a surrogate species for analysis](#)
 45 [\(Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS](#)~~Appendix D~~[Appendix D](#)). Results of the

1 quantitative modeling of mercury effects on largemouth bass as a surrogate species would
2 overestimate the effects on lesser sandhill crane as they primarily forage on cultivated crops and
3 invertebrates. Organisms feeding within pelagic-based (algal) food webs have been found to have
4 higher concentrations of methylmercury than those in benthic or epibenthic food webs; this has
5 been attributed to food chain length and dietary segregation (Grimaldo et al. 2009). Modeled effects
6 of mercury concentrations from changes in water operations under CM1 on largemouth bass did not
7 differ substantially from existing conditions; therefore, results also indicate that lesser sandhill
8 crane tissue concentrations would not measurably increase as a result of CM1 implementation.

9 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
10 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
11 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
12 mercury. Increased methylmercury associated with natural community and floodplain restoration
13 may indirectly affect lesser sandhill crane via uptake in lower trophic levels (Draft BDCP Appendix
14 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
15 potential areas in total may result in generalized, very low level increases of mercury. Given that
16 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
17 some level of effects.

18 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
19 into the foodweb, *CM12 Methylmercury Management*, is included to provide for site-specific
20 evaluation for each restoration project. If a project is identified where there is a high potential for
21 methylmercury production that could not be fully addressed through restoration design and
22 adaptive management, alternate restoration areas would be considered. CM-12 would be
23 implemented in coordination with other similar efforts to address mercury in the Delta, and
24 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
25 would include the following actions.

- 26 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
27 mercury methylation and bioavailability
- 28 ● Define design elements that minimize conditions conducive to generation of methylmercury in
29 restored areas.
- 30 ● Define adaptive management strategies that can be implemented to monitor and minimize
31 actual postrestoration creation and mobilization of methylmercury.

32 ~~Covered activities have the potential to exacerbate bioaccumulation of mercury in lesser sandhill~~
33 ~~crane. Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase~~
34 ~~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). Increased methylmercury associated with natural community~~
39 ~~and floodplain restoration may indirectly affect lesser sandhill crane via uptake in lower trophic~~
40 ~~levels (BDCP Appendix 5.D, *Contaminants*). The potential mobilization or creation of methylmercury~~
41 ~~within the study area varies with site-specific conditions and would need to be assessed at the~~
42 ~~project level. *CM12 Methylmercury Management* includes provisions for project-specific Mercury~~
43 ~~Management Plans. Along with avoidance and minimization measures and adaptive management~~

1 ~~and monitoring, CM12 Methylmercury Management would be available to address the uncertainty of~~
2 ~~methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill crane.~~

3 ~~The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane~~
4 ~~for the following reasons: 1) lesser sandhill cranes occur in the study area only during the~~
5 ~~nonbreeding months, 2) their primary foraging habitats in the study area are cultivated crops, and~~
6 ~~3) the use of restored tidal wetlands by cranes is likely to be limited compared to seasonal managed~~
7 ~~wetlands.~~

8 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low
9 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf
10 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also
11 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The
12 effect of selenium toxicity differs widely between species and also between age and sex classes
13 within a species. In addition, the effect of selenium on a species can be confounded by interactions
14 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

15 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
16 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
17 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
18 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
19 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
20 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
21 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
22 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
23 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
24 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic
25 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
26 levels of selenium have a higher risk of selenium toxicity.

27 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
28 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
29 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh
30 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
31 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
32 BDCP restoration activities that create newly inundated areas could increase bioavailability of
33 selenium (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration).
34 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality, of the Draft EIR/EIS*
35 and it was determined that, relative to Existing Conditions and the No Action Alternative, CM1
36 would not result in substantial, long-term increases in selenium concentrations in water in the Delta
37 under any alternative. However, it is difficult to determine whether the effects of potential increases
38 in selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)
39 would lead to adverse effects on lesser sandhill crane.

40 Because of the uncertainty that exists at this programmatic level of review, there could be a
41 substantial effect on lesser sandhill crane from increases in selenium associated with restoration
42 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
43 *Management (Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEISBDCP Appendix 3.C,*
44 *Avoidance and Minimization Measures)* which would provide specific tidal habitat restoration design

1 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
2 habitats. Furthermore, the effectiveness of selenium management to reduce selenium
3 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
4 part of design and implementation. This avoidance and minimization measure would be
5 implemented as part of the tidal habitat restoration design schedule.

6 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise (~~13,421-~~
7 ~~43,125 acres~~) and pile driving (~~1,989-14,111 acres~~) above baseline level (50–60 dBA). However,
8 lesser sandhill cranes are less traditional in their winter roost sites than greater sandhill cranes and
9 may be more likely to travel away from disturbed areas to roost in more suitable habitat.
10 Construction in certain areas would take place 7 days a week and 24 hours a day and evening and
11 nighttime construction activities would require the use of extremely bright lights, which could
12 adversely affect roosting cranes by impacting their sense of photo-period and by exposing them to
13 predators. Effects of noise and visual disturbance could substantially alter the suitability of habitat
14 for lesser sandhill crane. The effects of noise and visual disturbances would be reduced through the
15 implementation of AMM20 Greater Sandhill Crane, which would include requirements (described
16 above) to minimize the effects of noise and visual disturbance on sandhill cranes and to mitigate for
17 affected habitat. With these measures in place, in addition to AMM1–AMM7, noise and visual
18 disturbances, the potential for hazardous spills, increased dust and sedimentation, and operations
19 and maintenance of the water conveyance facilities would not result in an adverse effect on the
20 lesser sandhill crane.

21 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
22 which could result in the mortality of a special status species. This effect would be addressed
23 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
24 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
25 bioavailability in tidal habitats.

26 With these measures in place, the effects of noise and visual disturbance, potential spills of
27 hazardous materials, and increased exposure to selenium would not have an adverse effect on lesser
28 sandhill crane.

29 The implementation of tidal natural communities restoration or floodplain restoration could result
30 in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of
31 increased mercury exposure is likely low for lesser sandhill crane because they primarily forage on
32 cultivated crops and associated invertebrates. Implementation of CM12 which contains measures to
33 assess the amount of mercury before project development, followed by appropriate design and
34 adaptation management, would minimize the potential for increased methylmercury exposure, and
35 would result in no adverse effect on the species.

36 The implementation of tidal natural communities restoration or floodplain restoration could result
37 in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of
38 increased mercury exposure is likely low for lesser sandhill crane. However, it is unknown what
39 concentrations of methylmercury are harmful to the species, and the potential for increased
40 exposure varies substantially within the study area. Site-specific restoration plans that address the
41 creation and mobilization of mercury, as well as monitoring and adaptive management as described
42 in CM12 Methylmercury Management, would be available to address the uncertainty of
43 methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill crane. The
44 site-specific planning phase of marsh restoration would be the appropriate place to assess the

1 ~~potential for risk of methylmercury exposure for lesser sandhill crane, once site specific sampling~~
2 ~~and other information could be developed.~~

3 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise
4 ~~(13,421–43,125 acres) and pile driving (1,989–14,111 acres)~~ above baseline level (50–60 dBA).
5 However, lesser sandhill cranes are less traditional in their winter roost sites and may be more
6 likely to travel away from disturbed areas to roost in more suitable habitat. Construction in certain
7 areas would take place 7 days a week and 24 hours a day and evening and nighttime construction
8 activities would require the use of extremely bright lights, which could adversely affect roosting
9 cranes by impacting their sense of photo-period and by exposing them to predators. ~~Effects of noise~~
10 ~~and visual disturbance could substantially alter the suitability of habitat for lesser sandhill crane.~~
11 ~~This would be a significant impact. The effects of noise and visual disturbances would be reduced~~
12 ~~through the implementation of~~ With AMM20 Greater Sandhill Crane in place, which would include
13 requirements (described above) to minimize the effects of noise and visual disturbance on sandhill
14 cranes ~~and to mitigate for affected habitat, there would not be an adverse effect on lesser sandhill~~
15 ~~crane.~~

16 ~~Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium~~
17 ~~which could result in the potential mortality of a special-status species. This would be a significant~~
18 ~~impact. This effect would be addressed through the implementation of~~ AMM27 Selenium
19 Management, which would provide specific tidal habitat restoration design elements to reduce the
20 ~~potential for bioaccumulation of selenium and its bioavailability in tidal habitats.~~

21 ~~Methylmercury tissue concentrations in lesser sandhill crane would not be expected to measurably~~
22 ~~increase as a result of water operations under CM1 compared to the No Action Alternative. The~~
23 ~~implementation of tidal natural communities restoration or floodplain restoration could result in~~
24 ~~increased exposure of lesser sandhill crane to methylmercury. This would be a significant impact.~~
25 ~~The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane~~
26 ~~because they primarily forage on cultivated crops and associated invertebrates. Implementation of~~
27 ~~CM12 which contains measures to assess the amount of mercury before project development,~~
28 ~~followed by appropriate design and adaptation management, would minimize the potential for~~
29 ~~increased methylmercury exposure, and would result in no adverse effect on lesser sandhill crane.~~

30 ~~With AMM1-AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation~~
31 ~~under Alternative 4 would not substantially reduce the number or restrict the range of lesser~~
32 ~~sandhill cranes. Therefore, the indirect effects of Alternative 4 implementation would have a less-~~
33 ~~than-significant impact on lesser sandhill crane.~~

34 ~~The implementation of tidal natural communities restoration or floodplain restoration could result~~
35 ~~in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of~~
36 ~~increased mercury exposure is likely low for lesser sandhill crane. However, it is unknown what~~
37 ~~concentrations of methylmercury are harmful to the species, and the potential for increased~~
38 ~~exposure varies substantially within the study area. Site-specific restoration plans that address the~~
39 ~~creation and mobilization of mercury, as well as monitoring and adaptive management as described~~
40 ~~in~~ CM12 Methylmercury Management, would be available to address the uncertainty of
41 ~~methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill crane. Tidal~~
42 ~~habitat restoration could result in increased exposure of lesser sandhill crane to selenium. This~~
43 ~~impact would be addressed through the implementation of~~ AMM27 Selenium Management, which
44 ~~would provide specific tidal habitat restoration design elements to reduce the potential for~~

~~bioaccumulation of selenium and its bioavailability in tidal habitats. With AMM1–AMM7 and AMM27 Selenium Management in place, in addition to CM12 Methylmercury Management, indirect effects of Alternative 4 implementation would have a less than significant impact on lesser sandhill crane.~~

Least Bell's Vireo and Yellow Warbler

This section describes the effects of Alternative 4, including water conveyance facilities construction and implementation of other conservation components, on least Bell's vireo and yellow warbler. Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that contain a dense shrub component, including all willow-dominated alliances.

Construction and restoration associated with Alternative 4 conservation measures would result in both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as indicated in Table 12-4-33. Full implementation of Alternative 4 would also include the following conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler (~~BDCP~~ see Chapter 3, Section 3.3, *Biological Goals and Objectives*, ~~of the Draft BDCP~~).

- 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 CM7).
- 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, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, 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.

1 **Table 12-4-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated with**
 2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Migratory and breeding	32	32	27	27	NA	NA
Total Impacts CM1		32	32	27	27		
CM2–CM18	Migratory and breeding	382	656	88	109	48–85	148
Total Impacts CM2–CM18		382	656	88	109	48–85	148
TOTAL IMPACTS		414	688	115	136	48–85	148

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

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 4 conservation measures would result in the combined permanent and temporary loss
 7 of up to ~~817-824~~ acres of modeled habitat (~~685-688~~ acres of permanent loss and ~~132-136~~ acres of
 8 temporary loss) for least Bell’s vireo and yellow warbler (Table 12-4-33). Conservation measures
 9 that would result in these losses are conveyance facilities and transmission line construction, and
 10 establishment and use of ~~reusable tunnel material borrow and spoil~~ areas (CM1), Fremont
 11 Weir/Yolo Bypass fisheries improvements (CM2), tidal natural communities restoration (CM4), and
 12 seasonally inundated floodplain restoration (CM5). Habitat enhancement and management activities
 13 (CM11) which include ground disturbance or removal of nonnative vegetation, could result in local
 14 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
 15 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate least
 16 Bell’s vireo and yellow warbler habitat. Each of these individual activities is described below. A
 17 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follows the
 18 individual conservation measure discussions.

- 19 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
 20 facilities would result in the combined permanent and temporary loss of up to ~~52-59~~ acres of
 21 modeled least Bell’s vireo and yellow warbler habitat (Table 12-4-33). Of the ~~52-59~~ acres of
 22 modeled habitat that would be removed for the construction of the conveyance facilities, ~~29-32~~
 23 acres would be a permanent loss and ~~23-27~~ acres would be a temporary loss of habitat.

1 Activities that would impact modeled habitat consist of the construction of tunnel, forebay, and
 2 intake construction, permanent and temporary access roads, ~~and~~ construction of transmission
 3 lines, and temporary barge unloading facilities and work areas. Impacts from CM1 would occur
 4 in the central delta in CZs 3, 4, 5, 6, and 8. Permanent habitat loss would occur from the
 5 construction of Intakes 2, 3, and 5 on the east bank of the Sacramento River between Freeport
 6 and Courtland. Some habitat would also be impacted by the construction of a permanent access
 7 road from the new forebay west to a reusable tunnel material disposal area and where the
 8 realigned Highway 160 would cross Snodgrass Slough. Additional losses would also occur along
 9 Lambert Road where permanent utility lines would be installed and from the construction of an
 10 operable barrier at the confluence of Old River and the San Joaquin River. Temporary losses of
 11 habitat would occur from the construction of a barge unloading facility west of the intermediate
 12 forebay in Snodgrass Slough and where temporary work areas surround intake sites.
 13 Temporarily affected areas would be restored as riparian habitat within 1 year following
 14 completion of construction activities as described in AMM10 Restoration of Temporarily Affected
 15 Natural Communities. Although the effects are considered temporary, the restored riparian
 16 habitat would require a period of time for ecological succession to occur and for restored
 17 riparian habitat to functionally replace habitat that has been affected. However, restored
 18 riparian vegetation can have the habitat structure to support breeding vireos within 3 to 5
 19 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus
 20 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian
 21 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced
 22 riparian vegetation would be expected to have structural components comparable to the
 23 temporarily removed vegetation within the first 5 to 10 years after the initial restoration
 24 activities are complete. There are no occurrences of least Bell's vireo or yellow warbler that
 25 intersect with the CM1 footprint. Refer to the Terrestrial Biology Map-~~B~~book in Appendix A of
 26 this RDEIR/SDEIS for a detailed view of Alternative 4 construction locations. Impacts from CM1
 27 would occur within the first 10-14 years of Alternative 4 implementation.

- 28 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements
 29 would permanently remove approximately 83 acres and temporarily remove 88 acres of
 30 modeled least Bell's vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is
 31 expected to occur during the first 10 years of Alternative 4 implementation.
- 32 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 33 inundation would permanently remove an estimated 545 acres of modeled least Bell's vireo and
 34 yellow warbler habitat.
- 35 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 36 seasonally inundated floodplain would permanently remove approximately 28 acres and
 37 temporarily remove 21 acres of modeled least Bell's vireo and yellow warbler habitat. Based on
 38 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill
 39 riparian habitat would be restored as a component of seasonally inundated floodplain
 40 restoration actions.

41 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore
 42 may differ from these estimates, depending on how closely the actual outcome of tidal habitat
 43 restoration approximates the assumed outcome. However, riparian restoration from CM4 and
 44 CM5 would increase the extent of least Bell's vireo and yellow warbler habitat within the study
 45 area once the restored riparian vegetation has developed habitat functions for these species.

- 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 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
8 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats
9 are expected to maintain and improve the functions of the habitat over the term of the BDCP.
10 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in
11 protected habitat, which would maintain conditions favorable for future species establishment
12 in the study area. If least Bell's vireo and yellow warbler established breeding populations in
13 restored riparian habitats in the study area, occupied habitat would be monitored to determine
14 if there were a need to implement controls on brood parasites (brown-headed cowbird) or nest
15 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and
16 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the
17 stability of newly established populations.
- 18 Habitat management- and enhancement-related activities could disturb least Bell's vireo and
19 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment
20 operation could destroy nests, and noise and visual disturbances could lead to their
21 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to
22 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the
23 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
24 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
25 *Surveys and Avoid Disturbance of Nesting Birds*.
- 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 least Bell's vireo and yellow warbler use of the surrounding
29 habitat. Maintenance activities would include vegetation management, levee and structure
30 repair, and re-grading of roads and permanent work areas. These effects, however, would be
31 reduced by AMMs and conservation actions as described below.
- 32 • *Injury and Direct Mortality*: ~~Although nesting of least Bell's vireo nesting and yellow warbler~~
33 ~~has not been confirmed in the study area, area. Although there have been~~ recent occurrences of
34 least Bell's vireo in the Yolo Bypass and of both least Bell's vireo and yellow warbler at the San
35 Joaquin River National Wildlife Refuge, ~~suggest that~~ the reestablishment of a breeding
36 population of either species is ~~a possibility unlikely over the duration of the BDCP over the term~~
37 of the project (14 years). ~~If present in the study area,~~ Construction-related activities would not
38 be expected to result in direct mortality of least Bell's vireo or yellow warbler because adults
39 and fledged young would be expected to avoid contact with construction and other equipment.
40 ~~However, if~~ either species were to nest in the construction area, equipment operation, noise
41 and visual disturbances could destroy nests or lead to their abandonment, resulting in mortality
42 of eggs and nestlings. These effects ~~on least Bell's vireo~~ would be avoided and minimized with
43 the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
44 *Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-75, *Conduct Preconstruction*
45 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address
46 adverse effects on nesting yellow warblers.

~~Temporarily affected areas would be restored as riparian habitat within 1 year following completion of construction activities. Although the effects are considered temporary, the restored riparian habitat would require a period of time for ecological succession to occur and for restored riparian habitat to functionally replace habitat that has been affected. However, restored riparian vegetation can have the habitat structure to support breeding vireos within 3 to 5 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian vegetation to be temporarily removed is early to mid-successional; therefore, the replaced riparian vegetation would be expected to have structural components comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial restoration activities are complete.~~

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

Near-Term Timeframe

Because the water conveyance facilities construction (CM1) is being evaluated at the project level, the near-term BDCP conservation strategy has been evaluated to determine whether it would provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of construction would not be adverse under NEPA. Alternative 4 would remove 522-529 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These effects would result from the construction of the water conveyance facilities (CM1, 52-59 acres of habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of habitat).

Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter 3, *Conservation Strategy*, of the Draft BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby successional valley/foothill riparian habitat. Using these ratios would indicate that 52-59 acres of valley/foothill riparian habitat should be restored/created and 52-59 acres should be protected to compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects of other conservation actions would remove 470 acres of modeled habitat, and therefore require 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the valley/foothill riparian natural community in the Plan Area (see Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP-Chapter 3, *Conservation Strategy, of the Draft BDCP*). This restoration would provide the large contiguous patches needed for suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian restoration also include the restoration, maintenance

1 and enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
 2 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
 3 grasslands (Objective VFRNC2.1). These Plan objectives represent performance standards for
 4 considering the effectiveness of CM7 restoration and CM3 protection actions. The acres of protection
 5 contained in the near-term Plan goals and the additional detail in the biological objectives for least
 6 Bell's vireo satisfy the typical mitigation ratios that would be applied to the project-level effects of
 7 CM1, as well as mitigate the near-term effects of the other conservation measures. The restored
 8 riparian habitat could require 5 years to several decades, for ecological succession to occur and for
 9 restored riparian habitat to functionally replace habitat that has been affected. However, because
 10 the modeled habitat impacted largely consists of small patches of blackberry, willow, and riparian
 11 scrub, and because least Bell's vireo and yellow warbler are not known to be established breeders in
 12 the study area, BDCP actions would not be expected to have an adverse population-level effect on
 13 either species.

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*, *AMM7 Barge Operations Plan*, [*AMM10 Restoration of Temporarily Affected Natural*](#)
 19 [*Communities*](#), and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
 20 *Yellow-Billed Cuckoo*. All of these AMMs include elements that would avoid or minimize the risk of
 21 affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs are
 22 described in detail in [*Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an*](#)
 23 [*updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this*](#)
 24 [*RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures*](#). The yellow warbler is not a
 25 species that is covered under the BDCP. Although preconstruction surveys for least Bell's vireo may
 26 also detect yellow warblers (if they were to nest in the study area over the course of the BDCP), in
 27 order to have a less than adverse effect on individuals, preconstruction surveys for noncovered
 28 avian species would be required to ensure that yellow warbler nests were detected and avoided.
 29 Mitigation Measure BIO-75 would be available to address adverse effects on nesting yellow
 30 warblers.

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 4 as a whole would result in the
 34 permanent loss of and temporary effects on [817-824](#) acres of habitat for these species during the
 35 term of the Plan (7% of the total habitat in the study area). These losses would occur from the
 36 construction of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries*
 37 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
 38 *Restoration*. The locations of these losses would be in fragmented riparian habitat throughout the
 39 study area.

40 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
 41 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
 42 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
 43 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
 44 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
 45 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives

1 in the Plan for riparian restoration also include the maintenance and enhancement of structural
2 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
3 the least Bell's vireo and yellow warbler.

4 The BDCP's beneficial effects analysis (~~BDCP~~ see Chapter, Section 5.6, *Effects on Covered Wildlife and*
5 *Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
6 above could result in the restoration of 1,000 acres and the protection of 593 acres of habitat for the
7 least Bell's vireo, which would also be suitable habitat for the yellow warbler.

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, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*
13 *Communities*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
14 *Yellow-Billed Cuckoo*. All of these AMMs include elements that would avoid or minimize the risk of
15 affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs are
16 described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
17 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
18 RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.

19 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality
20 of these special-status species under Alternative 4 would represent an adverse effect in the absence
21 of other conservation actions. However, neither species is an established breeder in the study area
22 and impacts would likely be limited to loss of migratory habitat. In addition, with habitat protection
23 and restoration associated with CM3 and CM7, guided by biological goals and objectives and by
24 *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and Monitoring,*
25 *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*
26 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable*
27 *Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, AMM10 Restoration of*
28 *Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
29 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in place during all project
30 activities throughout the construction period, the effects of habitat loss and potential mortality on
31 least Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 4 would not be
32 adverse. The yellow warbler is not a species that is covered under the BDCP, and the potential for
33 mortality would be an adverse effect without preconstruction surveys to ensure that nests are
34 detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

35 **CEQA Conclusion:**

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 and/or restoration in an appropriate timeframe to ensure that
40 the impacts of construction would be less than significant under CEQA. Alternative 4 would remove
41 522-529 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the
42 near-term. These effects would result from the construction of the water conveyance facilities (CM1,
43 52-59 acres of habitat), and implementing other conservation measures (Yolo Bypass fisheries

1 improvements [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5],
2 470 acres of habitat).

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
4 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
5 3, *Conservation Strategy*, of the *Draft BDCP* would be 1:1 for restoration/creation and 1:1 protection
6 of dense shrubby successional valley/foothill riparian habitat. Using these ratios would indicate that
7 ~~52-59~~ acres of valley/foothill riparian habitat should be restored/created and ~~52-59~~ acres should be
8 protected to mitigate the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term
9 effects of other conservation actions would remove 470 acres of tidal natural communities, and
10 therefore require 470 acres of restoration and 470 acres of protection of dense shrubby
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 (*see* Table 3-4 in Chapter 3, *Description*
15 *of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM7
16 and would occur in the same timeframe as the construction and early restoration losses, thereby
17 avoiding adverse effects of habitat loss on least Bell's vireo and yellow warbler. The majority of the
18 riparian restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands
19 or large patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2
20 in *BDCP* Chapter 3, *Conservation Strategy, of the Draft BDCP*). This restoration would provide the
21 large contiguous patches needed for suitable least Bell's vireo and yellow warbler breeding habitat.
22 Goals and objectives in the Plan for riparian restoration also include the restoration, maintenance
23 and enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
24 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
25 grasslands (Objective VFRNC2.1). These Plan objectives represent performance standards for
26 considering the effectiveness of CM7 restoration and CM3 protection actions. ~~biological goals and~~
27 ~~objectives would inform the near-term protection and restoration efforts and represent~~
28 ~~performance standards for considering the effectiveness of restoration actions.~~

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, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural
34 Communities, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western
35 Yellow-Billed Cuckoo. All of these AMMs include elements that would avoid or minimize the risk of
36 affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs are
37 described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
38 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
39 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

40 In the absence of other conservation actions, the effects on least Bell's vireo and yellow warbler
41 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and
42 potential for direct mortality of special-status species. The acres of protection contained in the near-
43 term Plan goals and the additional detail in the biological objectives for least Bell's vireo satisfy the
44 typical mitigation ratios that would be applied to the project-level effects of CM1, as well as mitigate
45 the near-term effects of the other conservation measures. The restored riparian habitat could

1 require 5 years to several decades, for ecological succession to occur and for restored riparian
2 habitat to functionally replace habitat that has been affected. However, because the modeled habitat
3 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because
4 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,
5 temporal losses of potential habitat as a result of BDCP actions would not be expected to have an
6 adverse population-level effect on either species.

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.~~ The yellow warbler is not a species that is covered under the BDCP. Although
16 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
17 in the study area over the course of the BDCP), in order to have a less-than-avoid an adverse effect on
18 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
19 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the
20 potential impact on nesting yellow warblers to a less-than-significant impact, should they become
21 established in the study area. Considering the conservation actions described above, and AMMs 1-7
22 AMM 22, and Mitigation Measure BIO-75, Alternative 4, over the term of the BDCP would not result
23 in a substantial adverse effect through habitat modifications and would not substantially reduce the
24 number or restrict the range of either species. Therefore, Alternative 4 would have a less-than-
25 significant impact on least Bell's vireo and yellow warbler.

26 **Late Long-Term Timeframe**

27 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
28 habitat for least Bell's vireo and yellow warbler. Alternative 4 as a whole would result in the
29 permanent loss of and temporary effects on ~~817-824~~ acres of habitat for these species during the
30 term of the Plan (7% of the total habitat in the study area). These losses would occur from the
31 construction of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries*
32 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
33 *Restoration*. The locations of these losses would be in fragmented riparian habitat throughout the
34 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). Goals and objectives
41 in the Plan for riparian restoration also include the maintenance and enhancement of structural
42 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
43 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to
44 several decades, for ecological succession to occur and for restored riparian habitat to functionally
45 replace habitat that has been affected. Therefore, there would be a time-lag before the restored

1 habitat would benefit either species. However, neither species are established breeders in the study
2 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow
3 warbler.

4 The BDCP's beneficial effects analysis (~~BDCP~~ see Chapter 5, Section 5.6, *Effects on Covered Wildlife*
5 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
6 above could result in the restoration of 1,000 acres and the protection of 593 acres of habitat for the
7 least Bell's vireo, which would also be suitable habitat for the yellow warbler.

8 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these
9 special-status species under Alternative 4 would represent an adverse effect in the absence of other
10 conservation actions. However, neither species is an established breeder in the study area and
11 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.
12 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by
13 biological goals and objectives and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best*
14 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*
15 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*
16 *Disposal and Reuse of Spoils*, *AMM7 Reusable Tunnel Material*, *AMM10 Restoration of Temporarily*
17 *Affected Natural Communities*, and *Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM22*
18 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which
19 would be in place during all project activities throughout the construction period, the impact of
20 habitat loss and potential mortality on least Bell's vireo and the impact of habitat loss on yellow
21 warbler under Alternative 4 would be less than significant. The yellow warbler is not a species that
22 is covered under the BDCP. Although preconstruction surveys for least Bell's vireo may also detect
23 nesting yellow warblers, for the BDCP to have a less-than-significant impact on individuals,
24 preconstruction surveys for noncovered avian species would be required to ensure that yellow
25 warbler nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would
26 reduce this potential impact on nesting yellow warblers, if present in the study area, to a less-than-
27 significant level.

28 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 29 **Disturbance of Nesting Birds**

30 To reduce impacts on nesting birds, DWR will implement the measures listed below.

- 31 • To the maximum extent feasible, vegetation (trees, shrubs, ruderal areas) removal and
32 trimming will be scheduled during the nonbreeding season of birds (September 1–January
33 31). If vegetation removal cannot be removed in accordance with this timeframe,
34 preconstruction/preactivity surveys for nesting birds and additional protective measures
35 will be implemented as described below.
- 36 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting
37 surveys before the start of construction. A minimum of three separate surveys will be
38 conducted within 30 days prior to construction, with the last survey within 3 days prior to
39 construction. Surveys will include a search of all suitable nesting habitat (trees, shrubs,
40 ruderal areas, field crops) in the construction area. In addition, a 500-foot area around the
41 project area will be surveyed for nesting raptors, and a ~~250~~500-foot buffer area will be
42 surveyed for other nesting birds. If no active nests are detected during these surveys, no
43 additional measures are required.

- 1 • If active nests are found in the survey area, no-disturbance buffers will be established
2 around the nest sites to avoid disturbance or destruction of the nest site until the end of the
3 breeding season (approximately September 1) or until a qualified wildlife biologist
4 determines that the young have fledged and moved out of the project area (this date varies
5 by species). A qualified wildlife biologist will monitor construction activities in the vicinity
6 of the nests to ensure that construction activities do not affect nest success. The extent of the
7 buffers will be determined by the biologists in coordination with USFWS and CDFW and will
8 depend on the level of noise or construction disturbance, line-of-sight between the nest and
9 the disturbance, ambient levels of noise and other disturbances, and other topographical or
10 artificial barriers. Suitable buffer distances may vary between species.

11 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

12 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily
13 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the
14 affected habitat's extent and functions, including exposure to cowbird parasitism, a nest parasite of
15 both species. Because there are only two recent occurrences of least Bell's vireo within the study
16 area, and no occurrences of yellow warbler breeding in the study area, future occupancy would
17 likely consist of only a small number of individuals, and any such habitat fragmentation is expected
18 to have no or minimal effect on the species. Preconstruction surveys under AMM22 Suisun Song
19 Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo and Mitigation
20 Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting
21 Birds, would identify any nesting pairs and the potential for habitat fragmentation to affect either
22 species. If a nesting pairs of either species were detected where fragmentation has occurred, nests
23 would be monitored for edge effects or other effects caused by the disturbance. The habitat would
24 be adaptively managed to avoid or minimize impacts (e.g. cowbird control) under Environmental
25 Commitment 11 which includes the control of nonnative predators through habitat manipulation
26 techniques or trapping to reduce nest predation.

27 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the study
28 area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation
29 resulting from ground-disturbing operations is not expected to affect either species. If nesting pairs
30 of either species were detected where fragmentation has occurred, nests would be monitored for
31 edge effects or other effects caused by the disturbance. The habitat would be adaptively managed to
32 avoid or minimize impacts (e.g. cowbird control) under Environmental Commitment 11. Therefore,
33 the effect of habitat fragmentation would not have an adverse effect on least Bell's vireo or yellow
34 warbler.

35 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the
36 study area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation
37 resulting from ground-disturbing operations would not be expected to substantially modify habitat
38 or result in the direct mortality of special status species. If nesting pairs of either species were
39 detected where fragmentation has occurred, nests would be monitored for edge effects or other
40 effects caused by the disturbance. The habitat would be adaptively managed to avoid or minimize
41 impacts (e.g. cowbird control) under Environmental Commitment 11. Therefore, the effect of habitat
42 fragmentation, as a result of Alternative 4 would have a less-than-significant impact on least Bell's
43 vireo ~~or~~ and yellow warbler.

1 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical**
2 **Transmission Facilities**

3 Both least Bell's vireo and yellow warbler typically occur in early to mid-successional riparian
4 habitat, which is used to meet all of its life requisites. Least Bell's vireo are rarely observed in open
5 habitats away from riparian vegetation. Neither species form flocks and individuals generally
6 remain at or below the riparian canopy, below the height of proposed transmission lines (see
7 Appendix 5.J, Attachment 5J.C, Analysis of Potential Bird Collisions at Proposed BDCP Powerlines, of
8 the Draft BDCP). New transmission lines would increase the risk for bird power line strikes, which
9 could result in injury or mortality of least Bell's vireo and yellow warbler. While both species could
10 recolonize the study area during the permit term, recolonization would be expected to result
11 primarily in response to BDCP riparian restoration, which would occur largely in CZ 7, which does
12 not overlap with the proposed footprint for new transmission lines. The lack of occurrences in the
13 study area, ~~the lack of current and future higher value habitat patches in the vicinity of the~~
14 ~~proposed transmission lines,~~ and the behavior and habitat requirements of least Bell's vireo and
15 yellow warbler make collision with the proposed transmission lines highly unlikely. Marking
16 transmission lines with flight diverters that make the lines more visible to birds has been shown to
17 dramatically reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee
18 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
19 As described in AMM20 Greater Sandhill Crane, all new project transmission lines would be fitted
20 with flight diverters which would substantially reduce any potential for mortality of least Bell's
21 vireo or yellow warbler individuals from powerline collisions.

22 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse
23 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is
24 unlikely due to the lack of occurrences in the study area, ~~the lack of current and future higher value~~
25 ~~habitat patches in the vicinity of the proposed transmission lines,~~ and the behavior and habitat
26 requirements of these species. AMM20 Greater Sandhill Crane contains the commitment to place bird
27 strike diverters on all new powerlines, which would substantially reduce the risk of mortality from
28 bird strike for least Bell's vireo and yellow warbler from the project. Therefore, the construction and
29 operation of new transmission lines would not result in an adverse effect on least Bell's vireo or
30 yellow warbler.

31 **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-
32 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline
33 strikes is unlikely due to the lack of occurrences in the study area, ~~the lack of current and future~~
34 ~~higher value habitat patches in the vicinity of the proposed transmission lines,~~ and the behavior and
35 habitat requirements of these species. AMM20 Greater Sandhill Crane contains the commitment to
36 place bird strike diverters on all new powerlines, which would substantially reduce the risk of
37 mortality from bird strike for least Bell's vireo and yellow warbler from the project. Therefore, the
38 construction and operation of new transmission lines would result in a less-than-significant impact
39 on least Bell's vireo or yellow warbler.

40 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow**
41 **Warbler**

42 **Indirect construction- and operation-related effects:** If least Bell's vireo or yellow warbler were
43 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
44 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the

1 functions of suitable nesting habitat for these species. Construction noise above background noise
 2 levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities
 3 ([Draft BDCP-Appendix 5.J, Attachment 5J.D, Indirect Effects of the Construction of the BDCP](#)
 4 [Conveyance Facility on Sandhill Crane, Table 4 in Appendix D, Substantive BDCP Revisions, of this](#)
 5 [RDEIR/SEIS](#)), although there are no available data to determine the extent to which these noise
 6 levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun Song Sparrow, Yellow-Breasted*
 7 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce the potential for adverse effects
 8 of construction-related activities on survival and productivity of nesting least Bell's vireo and a 500
 9 foot no-disturbance buffer would be established around the active nest. Mitigation Measure BIO-75,
 10 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 11 available to reduce the potential for adverse effects of construction-related activities on nesting
 12 yellow warbler. The use of mechanical equipment during water conveyance facilities construction
 13 could cause the accidental release of petroleum or other contaminants that could affect least Bell's
 14 vireo and yellow warbler in the surrounding habitat. The inadvertent discharge of sediment or
 15 excessive dust adjacent to suitable habitat could also have an adverse effect on these species. *AMM2*
 16 *Construction Best Management Practices and Monitoring* would minimize the likelihood of such spills
 17 and ensure that measures are in place to prevent runoff from the construction area and negative
 18 effects of dust on active nests.

19 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 20 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and
 21 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.
 22 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
 23 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains
 24 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could
 25 increase bioavailability of mercury (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#)
 26 for details of restoration). Species sensitivity to methylmercury differs widely and there is a large
 27 amount of uncertainty with respect to species-specific effects. Increased methylmercury associated
 28 with natural community and floodplain restoration could indirectly affect least Bell's vireo and
 29 yellow warbler, via uptake in lower trophic levels (as described in [the BDCP, Appendix 5.D,](#)
 30 [Contaminants, of the Draft BDCP](#)).

31 The potential mobilization or creation of methylmercury within the study area varies with site-
 32 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
 33 *Management* ([as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS](#)) contains
 34 provisions for project-specific Mercury Management Plans. Site-specific restoration plans that
 35 address the creation and mobilization of mercury, as well as monitoring and adaptive management
 36 as described in CM12 would be available to address the uncertainty of methylmercury levels in
 37 restored tidal marsh and potential impacts on least Bell's vireo and yellow warbler.

38 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,
 39 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be
 40 adverse with the implementation of AMM1-AMM7, and *AMM22 Suisun Song Sparrow, Yellow-*
 41 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*
 42 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 43 address adverse effects on nesting yellow warblers. The implementation of tidal natural
 44 communities restoration or floodplain restoration could result in increased exposure of least Bell's
 45 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is
 46 unknown what concentrations of methylmercury are harmful to these species. 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 Methylmercury Management*, would be available to
3 address the uncertainty of methylmercury levels in restored tidal marsh and potential adverse
4 effects of methylmercury on least Bell's vireo and yellow warbler.

5 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
6 sedimentation, and operations and maintenance of the water conveyance facilities would have a
7 less-than-significant impact on least Bell's vireo and yellow warbler with the implementation of
8 *AMM2 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*
9 *Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
10 *Nesting Birds,* and *AMM2 Construction Best Management Practices and Monitoring.* The
11 implementation of tidal natural communities restoration or floodplain restoration could result in
12 increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
13 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
14 to these species. Sites-specific restoration plans that address the creation and mobilization of
15 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*
16 *Management*, would be available to address the uncertainty of methylmercury levels in restored
17 tidal marsh and significant impacts on least Bell's vireo and yellow warbler.

18 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
19 **Disturbance of Nesting Birds**

20 See Mitigation Measure BIO-75 under Impact BIO-75.

21 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**
22 **Habitat as a Result of Implementation of Conservation Components**

23 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
24 duration of inundation of approximately 48–85 acres of modeled least Bell's vireo and yellow
25 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,
26 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat
27 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and
28 inundation would be within the tolerance of these vegetation types.

29 Based on hypothetical floodplain restoration for CM5, construction of setback levees could result in
30 periodic inundation of up to 148 acres of modeled least Bell's vireo and yellow warbler habitat in CZ
31 7. Inundation of restored floodplains would not be expected to affect least Bell's vireo, yellow
32 warbler, or their habitat because the breeding period is outside the period when floodplains would
33 likely be inundated. Additionally, periodic inundation of floodplains would be expected to restore a
34 more natural flood regime in support of riparian vegetation types that support least Bell's vireo and
35 yellow warbler habitat. The overall effect of seasonal inundation in existing riparian natural
36 communities would be beneficial, because, historically, flooding was the main natural disturbance
37 regulating ecological processes in riparian areas, and flooding promotes the germination and
38 establishment of many native riparian plants.

39 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres
40 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,
41 periodic effects of inundation would not result in an adverse effect on least Bell's vireo or yellow
42 warbler because inundation would occur primarily during the nonbreeding season and would

1 promote a more natural flood regime in support of habitat for these species. The effect would be
2 beneficial.

3 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85
4 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell’s vireo and yellow warbler.
5 However, periodic effects of inundation would have a less-than-significant impact on least Bell’s
6 vireo or yellow warbler because inundation would occur during the nonbreeding season and would
7 not be expected to adversely modify habitat or result in direct mortality of either species. Flooding
8 promotes the germination and establishment of many native riparian plants. Therefore, the overall
9 impact of seasonal inundation in existing riparian natural communities would be beneficial for least
10 Bell’s vireo and yellow warbler.

11 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

12 This section describes the effects of Alternative 4, including water conveyance facilities construction
13 and implementation of other conservation components, on Suisun song sparrow and saltmarsh
14 common yellowthroat. The habitat model used to assess effects on Suisun song sparrow and
15 saltmarsh common yellowthroat is based on primary breeding habitat and secondary habitat.
16 Suisun song sparrow and saltmarsh common yellowthroat primary habitat consists of all *Salicornia*-
17 dominated tidal brackish emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-dominated tidal
18 freshwater emergent wetland in the study area west of Sherman Island, with the exception that
19 *Scirpus acutus* and *S. californicus* plant communities (low marsh) and all of the plant communities
20 listed below that occur in managed wetlands were classified as secondary habitat. Upland
21 transitional zones, providing refugia during high tides, within 150 feet of the wetland edge were also
22 included as secondary habitat. Secondary habitats generally provide only a few ecological functions
23 such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland transition
24 zones), while primary habitats provide multiple functions, including breeding, effective predator
25 cover, and value forage.

26 Construction and restoration associated with Alternative 4 conservation measures would result in
27 both temporary and permanent losses of Suisun song sparrow and saltmarsh common yellowthroat
28 modeled habitat as indicated in Table 12-4-34. The majority of the losses would take place over an
29 extended period of time as tidal marsh is restored in the study area. Full implementation of
30 Alternative 4 would also include the following conservation actions over the term of the BDCP to
31 benefit the Suisun song sparrow and the saltmarsh common yellowthroat (BDCP-see Chapter 3,
32 Section 3.3, Biological Goals and Objectives, of the Draft BDCP).

- 33 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
34 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
35 with CM4).
- 36 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
37 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 38 • Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area
39 (Objective GNC1.4, associated with CM3).

40 As explained below, with the restoration and protection of these amounts of habitat, in addition to
41 natural community enhancement and management commitments (including *CM12 Methylmercury*
42 *Management*) and implementation of AMM1–AMM7, AMM22 *Suisun Song Sparrow, Yellow-Breasted*
43 *Chat, Least Bell’s Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, impacts on Suisun song
 2 sparrow and saltmarsh common yellowthroat would not be adverse for NEPA purposes and would
 3 be less than significant for CEQA purposes.

4 **Table 12-4-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled Habitat**
 5 **Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1							
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
Total Impacts CM2–CM18		1,152	3,633	0	0	0	0
TOTAL IMPACTS		1,152	3,688	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

6

7 **Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow**
 8 **and Saltmarsh Common Yellowthroat**

9 Alternative 4 conservation measures would result in the permanent loss of up to 3,510 acres of
 10 Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the
 11 conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres
 12 of secondary habitat to middle or high marsh (Table 12-4-34). The only conservation measure that
 13 would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4*
 14 *Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11),
 15 which include ground disturbance or removal of nonnative vegetation, could also result in local
 16 adverse habitat effects. Each of these individual activities is described below. A summary statement
 17 of the combined impacts and NEPA effects and a CEQA conclusion follows the individual
 18 conservation measure discussions.

- 19 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would
 20 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and
 21 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-4-34). In addition, 55 acres of
 22 primary habitat would be converted to secondary low marsh, and 123 acres of secondary
 23 habitat would be converted to middle or high marsh. Most areas proposed for removal would be

1 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and
 2 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately
 3 2% of primary habitat for these species would be converted to foraging habitat. Full
 4 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent
 5 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow
 6 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland
 7 communities that are self-sustaining and not reliant on ongoing management actions necessary
 8 to maintain the existing managed wetland habitats would better ensure the long-term viability
 9 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and
 10 yellowthroat abundance and distribution would be monitored, and the restoration of tidal
 11 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats
 12 until functional habitats were restored (see ~~BDCP~~ Chapter 3, Section 3.4.4, *Conservation Measure 4*
 13 *Tidal Natural Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring*
 14 *Program*, of the Draft BDCP).

- 15 ● *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song
 16 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be
 17 expected to reduce predation loss of nests and, consequently, increase and maintain the
 18 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal
 19 habitats over the term of the BDCP. Habitat management- and enhancement-related activities
 20 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located
 21 near work sites. The potential for these activities to have an adverse effect on Suisun song
 22 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*
 23 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure
 24 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,
 25 would be available to address these effects on saltmarsh common yellowthroat. A variety of
 26 *CM11 Natural Communities Enhancement and Management* habitat management actions that are
 27 designed to enhance wildlife values in restored and protected tidal wetland habitats may result
 28 in localized ground disturbances that could temporarily remove small amounts of Suisun song
 29 sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,
 30 such as removal of nonnative vegetation and road and other infrastructure maintenance
 31 activities, are expected to have minor adverse effects on available species' habitat.
- 32 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
 33 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song
 34 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.
 35 Maintenance activities could include vegetation management, and levee repair. These effects,
 36 however, would be reduced by AMMs and conservation actions as described below.
- 37 ● *Construction-related activities* could result in nest destruction or disturbance resulting in
 38 mortality of eggs and nestlings if restoration activities took place within the nesting period for
 39 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
 40 *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation
 41 Measure *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 42 *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,
 43 filling, contouring, and other initial ground-disturbing operations during restoration activities
 44 could temporarily fragment existing modeled tidal brackish emergent wetland habitat for
 45 Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the
 46 extent and functions of the affected habitat. These temporary effects would be minimized

1 through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*
2 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

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 Under Alternative 4, there would be no impacts resulting from the construction of the water
8 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled
9 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
10 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
11 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would
12 provide primary nesting habitat for these species. Although there would be a temporal lag in these
13 conversions, there would be no net loss of primary habitat in the near-term. These effects would
14 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
15 Marsh in CZ 11.

16 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
17 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
18 Chapter 3, *Conservation Strategy*, of the *Draft BDCP* would be 1:1 for restoration/creation of tidal
19 brackish emergent habitat. Using this ratio would indicate that 1,152 acres of tidal brackish
20 emergent wetland should be restored/created to compensate for the near-term losses of Suisun
21 song sparrow and saltmarsh common yellowthroat habitat.

22 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
23 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are
24 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
25 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
26 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11
27 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
28 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in *BDCP* Chapter
29 3, *Conservation Strategy, of the Draft BDCP*) and would be restored in a way that creates topographic
30 heterogeneity and in areas that increase connectivity among protected lands (Objective
31 TBEWNC1.4). Portions of the 4,800 acres of managed wetland would benefit both the Suisun song
32 sparrow and the saltmarsh common yellowthroat through the enhancement of degraded areas to
33 provide dense native vegetation, which is required for nesting sites, song perches, and refuge from
34 predators. Tidal wetlands would be restored in a mosaic of large, interconnected and biologically
35 diverse patches. Larger and more interconnected patches of suitable habitat would be expected to
36 reduce the effects of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative
37 predators would be controlled as needed to reduce nest predation and to help maintain species
38 abundance (CM11). Restoration would be sequenced over the term of the Plan and occur in a
39 manner that would minimize any temporary, initial loss and fragmentation of habitat. The acres of
40 restoration and protection contained in the near-term Plan goals, and the incorporation of the
41 additional measures in the biological goals and objectives (*BDCP* see Chapter 3, *Conservation*
42 *Strategy, of the Draft BDCP*) would be sufficient to mitigate the near-term effects of tidal restoration.

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. The*
 6 *AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft](#)*
 7 *[BDCP, and an updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of](#)*
 8 *[this RDEIR/SDEIS](#)~~BDCP Appendix 3.C, Avoidance and Minimization Measures.~~ The saltmarsh*
 9 *common yellowthroat is not a species that is covered under the BDCP. Although preconstruction*
 10 *surveys for Suisun song sparrow would likely also detect nesting saltmarsh common yellowthroat,*
 11 *in order to avoid adverse effects on individuals, preconstruction surveys for noncovered avian*
 12 *species would be required to ensure that saltmarsh common yellowthroat nests are detected and*
 13 *avoided. Mitigation Measure BIO-75 would be available to address adverse effects of construction*
 14 *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 4 as a whole would result in the permanent loss of 3,510 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~~[see](#) Chapter 5, Section 5.6, *Effects on Covered Wildlife*
 39 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
 40 above could result in the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary
 41 habitat in addition to the protection of 384 acres of secondary habitat for Suisun song sparrow,
 42 which would also benefit the 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 [Appendix 3.C, Avoidance and Minimization](#)*
7 *[Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)*
8 *[Substantive BDCP Revisions, of this RDEIR/SDEIS.](#) 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 4 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 additional measures in the biological goals and objectives, guided by 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 ~~during all project activities throughout the construction~~
17 ~~period,~~ the effects of habitat loss and potential mortality on Suisun song sparrow would not be
18 adverse, and the effects of habitat loss and conversion on saltmarsh common yellowthroat would
19 not be adverse under Alternative 4. The saltmarsh common yellowthroat is not a species that is
20 covered under the BDCP. Although preconstruction surveys for Suisun song sparrow would likely
21 also detect nesting saltmarsh common yellowthroat, for the BDCP to avoid adverse effects on
22 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
23 saltmarsh common yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would
24 be available to address this adverse effect.

25 **CEQA Conclusion:**

26 **Near-Term Timeframe**

27 Under Alternative 4, there would be no impacts resulting from the construction of the water
28 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled
29 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
30 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
31 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would
32 provide primary nesting habitat for these species. Although there would be a temporal lag in these
33 conversions, there would be no net loss of primary habitat in the near-term. These effects would
34 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
35 Marsh in CZ 11.

36 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
37 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
38 Chapter 3, [Conservation Strategy](#), of the [Draft](#) BDCP would be 1:1 for restoration/creation of tidal
39 brackish emergent habitat. Using this ratio would indicate that 1,152 acres of tidal brackish
40 emergent wetland should be restored/created to mitigate the near-term losses of Suisun song
41 sparrow and saltmarsh common yellowthroat habitat.

42 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
43 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are
44 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early

1 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
 2 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11
 3 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
 4 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in [BDCP Chapter](#)
 5 [3, Conservation Strategy, of the Draft BDCP](#)) and would be restored in a way that creates topographic
 6 heterogeneity and in areas that increase connectivity among protected lands (Objective
 7 TBEWNC1.4). Portions of the 4,800 acres of managed wetland would benefit both the Suisun song
 8 sparrow and the saltmarsh common yellowthroat through the enhancement of degraded areas to
 9 provide dense native vegetation, which is required for nesting sites, song perches, and refuge from
 10 predators. Tidal wetlands would be restored in a mosaic of large, interconnected and biologically
 11 diverse patches. Larger and more interconnected patches of suitable habitat would be expected to
 12 reduce the effects of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative
 13 predators would be controlled as needed to reduce nest predation and to help maintain species
 14 abundance (CM11). Restoration would be sequenced over the term of the Plan and occur in a
 15 manner that would minimize any temporary, initial loss and fragmentation of habitat. The acres of
 16 restoration and protection contained in the near-term Plan goals, and the incorporation of the
 17 additional measures in the biological goals and objectives ([BDCP-see Chapter 3, Conservation](#)
 18 [Strategy, of the Draft BDCP](#)) would be sufficient to mitigate the 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 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
 24 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would
 25 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The
 26 AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft](#)
 27 [BDCP, and an updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of](#)
 28 [this RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures](#). The saltmarsh
 29 common yellowthroat is not a species that is covered under the BDCP. Although preconstruction
 30 surveys for Suisun song sparrow would likely also detect nesting saltmarsh common yellowthroat,
 31 in order to avoid adverse effects on individuals, preconstruction surveys for noncovered avian
 32 species would be required to ensure that saltmarsh common yellowthroat nests are detected and
 33 avoided. Mitigation Measure BIO-75 would reduce the impact of construction activities on nesting
 34 saltmarsh common yellowthroat to a less-than-significant level.

35 [In the absence of other conservation actions, the effects on Suisun song sparrow and saltmarsh](#)
 36 [common yellowthroat would represent an adverse effect as a result of habitat modification and](#)
 37 [potential mortality of special-status species](#). Because the number of acres required to meet the
 38 typical mitigation ratio described above would be only 3,590 acres of restored/created tidal natural
 39 communities, the 6,000 acres of tidal brackish and tidal freshwater emergent wetland restoration
 40 and the 4,100 acres of managed wetland protection and enhancement contained in the near-term
 41 Plan goals, and the additional detail in the biological objectives for Suisun song sparrow, are more
 42 than sufficient to support the conclusion that the near-term impacts of habitat loss and direct
 43 mortality of Suisun song sparrow or saltmarsh common yellowthroat under Alternative 4 would be
 44 less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
3 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
4 Alternative 4 as a whole would result in the permanent loss of 3,510 acres of habitat (15% of the
5 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
6 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
7 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

8 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
9 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
10 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
11 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
12 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
13 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
14 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
15 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This
16 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
17 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
18 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
19 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
20 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
21 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
22 Restoration would be sequenced over the term of the Plan and occur in a manner that would
23 minimize any temporary, initial loss and fragmentation of habitat.

24 The BDCP's beneficial effects analysis (~~BDCP~~[see](#) Chapter 5, Section 5.6, *Effects on Covered Wildlife*
25 *and Plant Species*, [of the Draft BDCP](#)) estimates that the restoration and protection actions discussed
26 above could result in the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary
27 habitat in addition to the protection of 384 acres of secondary habitat for Suisun song sparrow,
28 which would also benefit the saltmarsh common yellowthroat.

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*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
34 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would
35 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and
36 storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization](#)
37 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)
38 [Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~BDCP~~[Appendix 3.C, Avoidance and Minimization](#)
39 [Measures](#). The saltmarsh common yellowthroat is not a covered species under the BDCP. Although
40 preconstruction surveys for Suisun song sparrow may detect nesting saltmarsh common
41 yellowthroat, for the BDCP to have a less-than-significant impact on individuals, preconstruction
42 surveys for noncovered avian species would be required to ensure that saltmarsh common
43 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would reduce this potential
44 impact on nesting saltmarsh common yellowthroat to a less-than-significant level.

1 Considering Alternative 4’s restoration provisions, which would replace low-value secondary
 2 habitat with high-value tidal brackish emergent habitat, including both foraging and primary
 3 habitat, and provide upland refugia for Suisun song sparrow and saltmarsh common yellowthroat,
 4 the acreages of restoration would be sufficient to mitigate habitats lost to construction and
 5 restoration activities. Loss of habitat or direct mortality through implementation of Alternative 4,
 6 with the implementation of AMM1–AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct*
 7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, 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 the species. Therefore, the loss of habitat or potential mortality
 10 under this alternative would have a less-than-significant impact on Suisun song sparrow and
 11 saltmarsh common yellowthroat.

12 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
 13 **Disturbance of Nesting Birds**

14 See Mitigation Measure BIO-75 under Impact BIO-75.

15 **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**
 16 **Saltmarsh Common Yellowthroat**

17 **Indirect construction-related effects:** If Suisun song sparrow or saltmarsh common yellowthroat
 18 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise
 19 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
 20 functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common
 21 yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,
 22 which could temporarily result in diminished use of habitat. Construction noise above background
 23 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
 24 activities ([Draft BDCP-Appendix 5.J](#), Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
 25 *Conveyance Facility on Sandhill Crane*, Table 4 [in Appendix D, Substantive BDCP Revisions, of this](#)
 26 [RDEIR/SEIS](#)), although there are no available data to determine the extent to which these noise
 27 levels could affect either species. If construction occurred during the nesting season, these indirect
 28 effects could result in the loss or abandonment of nests and mortality of any eggs and/or nestlings.
 29 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western Yellow-Billed Cuckoo*
 30 and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
 31 *of Nesting Birds*, would avoid the potential for adverse effects of construction-related activities on
 32 survival and productivity of Suisun song sparrow and saltmarsh common yellowthroat by requiring
 33 preconstruction surveys and, if nests are present, the establishment of a no-disturbance buffer
 34 within 250 feet of a nest site. The use of mechanical equipment during water conveyance facilities
 35 construction could cause the accidental release of petroleum or other contaminants that could affect
 36 species in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent
 37 to suitable habitat could also have an adverse effect on Suisun song sparrow and saltmarsh common
 38 yellowthroat. *AMM2 Construction Best Management Practices and Monitoring* would minimize the
 39 likelihood of such spills and ensure that measures are in place to prevent runoff from the
 40 construction area and any adverse effects of dust on active nests.

41 **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun
 42 Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal
 43 habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase
 44 as a result of water conveyance facilities operations and operations of salinity control gates to mimic

1 a more natural water flow. This would likely encourage the establishment of tidal wetland plant
2 communities tolerant of more saline environments, which should have a beneficial effect on Suisun
3 song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh
4 habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels
5 and sloughs in and around Suisun Marsh would be highly variable.

6 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
7 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
8 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
9 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
10 newly inundated areas could increase bioavailability of mercury ~~(see BDCP Chapter 3, Conservation~~
11 ~~Strategy, for details of restoration)~~. Although tidal habitat restoration might increase methylation of
12 mercury export to other habitats, restoration is unlikely to significantly increase the exposure of
13 Suisun song sparrow or saltmarsh common yellowthroat to methylmercury, as they currently reside
14 in tidal marshes where elevated methylmercury levels exist. Robinson et al. (2011) found toxic
15 levels of methylmercury levels in song sparrow populations from southern San Francisco Bay,
16 although populations near Suisun Marsh (i.e., San Pablo and Simas Creeks) were much lower. The
17 potential mobilization or creation of methylmercury within the study area varies with site-specific
18 conditions and would need to be assessed at the project level. The Suisun Marsh Plan anticipates
19 that restored tidal wetlands would generate less methylmercury than the existing managed
20 wetlands to be restored (Bureau of Reclamation et al. 2010).

21 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
22 into the foodweb, CM12 Methylmercury Management (as revised in Appendix D, Substantive BDCP
23 Revisions, in this RDEIR/SDEIS); is included to provide for site-specific evaluation for each
24 restoration project. On a project-specific basis, where high potential for methylmercury production
25 is identified that restoration design and adaptive management cannot fully address while also
26 meeting restoration objectives, alternate restoration areas will be considered. CM-12 will/would be
27 implemented in coordination with other similar efforts to address mercury in the Delta, and
28 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
29 will/would include the following actions.

- 30 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
31 mercury methylation and bioavailability
- 32 ● Define design elements that minimize conditions conducive to generation of methylmercury in
33 restored areas.
- 34 ● Define adaptive management strategies that can be implemented to monitor and minimize
35 actual postrestoration creation and mobilization of methylmercury.

36 ~~CM12 Methylmercury Management includes provisions for project-specific Mercury Management~~
37 ~~Plans. Along with avoidance and minimization measures and adaptive management and monitoring,~~
38 ~~CM12 would be available to address the uncertainty of methylmercury levels resulting from~~
39 ~~restored tidal marsh in the study area.~~

40 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song
41 sparrow with the implementation of AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's
42 Vireo, Western Yellow-Billed Cuckoo. Mitigation Measure BIO-75, Conduct Preconstruction Nesting
43 Bird Surveys and Avoid Disturbance of Nesting Birds, would be available to address adverse effects of
44 noise and visual disturbance on saltmarsh common yellowthroat. AMM1–AMM7, including AMM2

1 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and
2 ensure that measures were in place to prevent runoff from the construction area and to avoid
3 adverse effects of dust on the species.

4 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
5 habitat restoration would be expected to increase water salinity in Suisun Marsh, which would be
6 expected to establish tidal marsh similar to historic conditions.

7 Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow and
8 saltmarsh common yellowthroat through increased exposure to methylmercury, as these species
9 currently reside in tidal marshes where elevated methylmercury levels exist. However, it is
10 unknown what concentrations of methylmercury are harmful to the species and the potential for
11 increased exposure varies substantially within the study area. Implementation of CM12 which
12 contains measures to assess the amount of mercury before project development, followed by
13 appropriate design and adaptation management, would minimize the potential for increased
14 methylmercury exposure, and would result in no adverse effect on Suisun song sparrow and
15 saltmarsh common yellowthroat.~~Site-specific restoration plans in addition to monitoring and~~
16 ~~adaptive management, described in CM12 Methylmercury Management, would address the~~
17 ~~uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning phase of~~
18 ~~marsh restoration would be the appropriate place to assess the potential for risk of methylmercury~~
19 ~~exposure for these species, once site specific sampling and other information could be developed.~~

20 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
21 sedimentation, and operations and maintenance of the water conveyance facilities would be less
22 than significant with the implementation of AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat,*
23 *Least Bell's Vireo, Western Yellow-Billed Cuckoo,* Mitigation Measure BIO-75, *Conduct Preconstruction*
24 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* and AMM2 *Construction Best*
25 *Management Practices and Monitoring.*

26 Changes in salinity gradients would be expected to have a beneficial impact on Suisun song sparrow
27 and saltmarsh common yellowthroat through the establishment of tidal marsh similar to historic
28 conditions. The implementation of tidal natural communities restoration (CM4) is unlikely to
29 substantially increase the exposure of Suisun song sparrow or saltmarsh common yellowthroat to
30 methylmercury, as they currently reside in tidal marshes where elevated methylmercury levels
31 exist. However, it is unknown what concentrations of methylmercury are harmful to these species.
32 Sites-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 better inform potential impacts and address the uncertainty of methylmercury levels in restored
35 tidal marsh in the study area. With these additional avoidance and minimization measures,
36 Mitigation Measure BIO-75, and *CM12 Methylmercury Management*, indirect effects of Alternative 4
37 implementation would have a less-than-significant impact on Suisun song sparrow and saltmarsh
38 common yellowthroat.

39 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
40 **Disturbance of Nesting Birds**

41 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**
2 **Associated with Electrical Transmission Facilities**

3 The range of the Suisun song sparrow extends eastward into the study area to approximately
4 Kimball Island. There are several reported occurrences from Kimball Island, Browns Island, and in
5 the Suisun Marsh in the western portion of the study area. The easternmost range of the saltmarsh
6 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable
7 habitat, are far from the proposed transmission line routes (BDCP Attachment 5.J-2, *Memorandum:*
8 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current
9 populations, species ranges, and suitable habitat in the study area make collision with the proposed
10 transmission lines highly unlikely. Therefore the construction and presence of new transmission
11 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common
12 yellowthroat.

13 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
14 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the
15 current populations, species ranges, and suitable habitat for the species make collision with the
16 proposed transmission lines highly unlikely.

17 **CEQA Conclusion:** The construction and presence of new transmission lines would not be expected
18 to have an adverse effect on Suisun song sparrow and saltmarsh common yellowthroat because the
19 location of the current populations, species ranges, and suitable habitat for the species make
20 collision with the proposed transmission lines highly unlikely. Therefore, the construction and
21 presence of new transmission lines under Alternative 4 would have a less-than-significant impact on
22 Suisun song sparrow and saltmarsh common yellowthroat, ~~because the location of the current~~
23 ~~populations, species ranges, and suitable habitat for the species make collision with the proposed~~
24 ~~transmission lines highly unlikely.~~

25 **Swainson's Hawk**

26 This section describes the effects of Alternative 4, including water conveyance facilities construction
27 and implementation of other conservation components, on Swainson's hawk. The habitat model
28 used to assess impacts on Swainson's hawk includes plant alliances and land cover types associated
29 with Swainson's hawk nesting and foraging habitat. Construction and restoration associated with
30 Alternative 4 conservation measures would result in both temporary and permanent losses of
31 Swainson's hawk modeled habitat as indicated in Table 12-4-35. The majority of the losses would
32 take place over an extended period of time as tidal marsh is restored in the study area. Although
33 protection and restoration for the loss of nesting and foraging habitat would be initiated in the same
34 timeframe as the losses, it could take one or more decades (for nesting habitat) for restored habitats
35 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat
36 function would be minimized through specific requirements of *AMM18 Swainson's Hawk and White-*
37 *Tailed Kite*, including transplanting mature trees in the near-term time period. Full implementation
38 of Alternative 4 would also include the following conservation actions over the term of the BDCP to
39 benefit the Swainson's hawk (~~BDCP~~ see Chapter 3, Section 3.3, *Biological Goals and Objectives, of the*
40 *Draft BDCP*).

- 41 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
42 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
43 associated with CM7)

- 1 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
2 10 (Objective VFRNC1.2, 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 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
6 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11).
- 7 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
8 VPNC2.5, and GNC2.4, associated with CM11).
- 9 • Conserve at least 1 acre of Swainson’s hawk foraging habitat for each acre of lost foraging
10 habitat (Objective SH1.1, associated with CM3 and CM11).
- 11 • Protect at least 42,275 acres of cultivated lands as Swainson’s hawk foraging habitat with at
12 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated
13 with CM3 and CM11).
- 14 • Of the at least 42,275 acres of cultivated lands protected as Swainson’s hawk foraging habitat
15 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface
16 elevations greater than –1 foot NAVD88 (Objective SH1.3, associated with CM3).
- 17 • Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson’s
18 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 19 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
20 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 21 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
22 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
23 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
24 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

25 As explained below, with the restoration or protection of these amounts of habitat, in addition to
26 management activities that would enhance habitat for the species and implementation of AMM1–
27 *AMM7, AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM18 Swainson’s*
28 *Hawk and White-Tailed Kite* to minimize potential effects, impacts on Swainson’s hawk would not be
29 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT	CM2	CM5
CM1	Nesting	20	20	13	13	NA	NA
	Foraging	3,435 15	3,435 15	1,178	1,178	NA	NA
Total Impacts CM1		3,454 35	3,454 35	1,191	1,191		
CM2–CM18	Nesting	252	412	54	85	41–70	189
	Foraging	8,903	48,511	504	1,540	3,025–6,635	8,008
Total Impacts CM2-CM18		9,155	48,923	558	1,625	3,066-6,705	8,197
Total Nesting		272	432	67	98		
Total Foraging		12,338	51,946 926	1,682	2,718		
TOTAL IMPACTS		12,610	52,378 358	1,749	2,816	3,066-6,705	8,197

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 4 conservation measures would result in the combined permanent and temporary loss
6 of up to ~~5655,215-174~~ acres of modeled habitat (~~533-530~~ acres of nesting habitat and ~~5554,682-644~~
7 acres of foraging habitat) for Swainson’s hawk (Table 12-4-35). Conservation measures that would
8 result in these losses are conveyance facilities and transmission line construction, and establishment
9 and use of ~~reusable tunnel material borrow and spoil~~ areas (CM1), Yolo Bypass fisheries
10 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian
11 restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),
12 nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat
13 enhancement and management activities (CM11), which include ground disturbance or removal of
14 nonnative vegetation, could result in local 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 affect Swainson’s hawk modeled habitat. Each of these individual activities is
17 described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
18 conclusion follow the individual conservation measure discussions.

1 • *CM1 Water Facilities ~~and Operation~~Construction*: Construction of Alternative 4 water conveyance
 2 facilities would result in the combined permanent and temporary loss of up to ~~36-33~~ acres of
 3 Swainson’s hawk nesting habitat (~~18-20~~ acres of permanent loss habitat and ~~18-13~~ acres of
 4 temporary loss). In addition, ~~5,6314,593~~ acres of foraging habitat would be removed
 5 (~~4,3353,415~~ acres of permanent loss, ~~1,296-178~~ acres of temporary loss; Table 12-4-35).
 6 Activities that would impact modeled Swainson’s hawk habitat consist of tunnel, forebay, and
 7 intake construction, temporary access roads, and construction of transmission lines. Most of the
 8 permanent loss of nesting habitat would occur where Intakes 2, 3, and 5 impact the Sacramento
 9 River’s east bank between Freeport and Courtland. The riparian areas here are very small
 10 patches, some dominated by valley oak and others by nonnative trees. Some nesting habitat
 11 would be lost due to construction of a permanent access road from the new forebay west to a
 12 reusable tunnel material disposal area and where the realigned Highway 160 would cross
 13 Snodgrass Slough. Permanent losses would also occur along Lambert Road where permanent
 14 utility lines would be installed and from the construction of an operable barrier at the
 15 confluence of Old River and the San Joaquin River. Temporary losses of nesting habitat would
 16 occur ~~where pipelines cross~~from the construction of a barge unloading facility west of the
 17 intermediate forebay in Snodgrass Slough ~~and other small waterways east of the Sacramento~~
 18 River, and where temporary work areas surround intake sites. The riparian habitat in these
 19 areas is also composed of very small patches or stringers bordering waterways, which are
 20 composed of valley oak and scrub vegetation. There are at least 12 occurrences of nesting
 21 Swainson’s hawk that overlap with the construction footprint of CM1, primarily from the
 22 construction of intakes 2, 3, and 5, and the construction footprint for the permanent and
 23 temporary transmission lines. The implementation of *AMM18 Swainson’s Hawk and White-Tailed*
 24 *Kite* (see Appendix D, *Substantive BDCP Revisions, of this RDEIR/SDEIS* Appendix 3.C, *Avoidance*
 25 *and Minimization Measures, of the Draft BDCPBDCP* Appendix 3.C, *Avoidance and Minimization*
 26 *Measures*) would minimize the effects of construction on nesting Swainson’s hawks if present in
 27 the area. Impacts on foraging habitat would occur throughout the central Delta in CZs 3- 6, and
 28 CZ 8. Permanent foraging habitat impacts would include ~~908-883~~ acres of very high-value
 29 habitat (Table 12-4-36). Refer to the Terrestrial Biology Map ~~B~~book in Appendix A of this
 30 RDEIR/SDEIS for a detailed view of Alternative 4 construction locations. Impacts from CM1
 31 would occur within the first ~~10-14~~ years of Alternative 4 implementation.

32 **Table 12-4-36. Acres of Impacted Foraging Habitat by Value Classes for Swainson’s Hawk**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2-18 permanent (temporary)
Very high	Alfalfa hay	908-883 (120174)	12,002 (345)
Moderate	Irrigated pasture, other hay crops	1,188-456 (705529)	24,865 (642)
Low	Other irrigated field and truck/berry crops	86-92 (10067)	5,911 (313)
Very low	Safflower, sunflower, corn, grain sorghum	2,152986 (371408)	5,732 (241)

33

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 133 acres of nesting
 36 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 37 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554

1 acres of temporary loss). Activities through CM2 could involve excavation and grading in
 2 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 3 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 4 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 5 Sacramento Weir would also remove Swainson's hawk habitat. The loss is expected to occur
 6 during the first 10 years of Alternative 4 implementation.

- 7 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 8 inundation would permanently remove an estimated 295 acres of Swainson's hawk nesting
 9 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of
 10 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
 11 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
 12 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
 13 directly impact and fragment grassland just north of Rio Vista in and around French and
 14 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
 15 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
 16 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of
 17 10,757 acres of very high-value (alfalfa), 18,565 acres of moderate-value, and 4,098 acres of
 18 low-value habitat (See Table 12-4-36 for land cover types classified by habitat value). Because
 19 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce
 20 the use of remaining cultivated lands or preclude access to surrounding lands. However, the
 21 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal
 22 restoration footprints could result in the removal or abandonment of nesting territories that
 23 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree
 24 mortality would be expected over time as areas became tidally inundated. Depending on the
 25 extent and value of remaining habitat, this could reduce the local nesting population. There are
 26 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for
 27 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal
 28 restoration activities.
- 29 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 30 seasonally inundated floodplain and riparian restoration actions would remove approximately
 31 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary
 32 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of
 33 temporary loss). These losses would be expected after the first 10 years of Alternative 4
 34 implementation along the San Joaquin River and other major waterways in CZ 7.
- 35 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 36 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and
 37 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27
 38 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 39 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
 40 implemented on agricultural lands and would result in the conversion of 1,849 acres of
 41 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
 42 and 11. If agricultural lands supporting higher value foraging habitat than the restored
 43 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 44 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
 45 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and

1 CZ 4. Small patches of riparian vegetation that support Swainson’s hawk nesting habitat may
2 develop along the margins of restored nontidal marsh if appropriate site conditions are present.

- 3 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
4 enhancement-related activities could disturb Swainson’s hawk nests if they were present near
5 work sites. A variety of habitat management actions that are designed to enhance wildlife values
6 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
7 remove small amounts of Swainson’s hawk habitat and reduce the functions of habitat until
8 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
9 and road and other infrastructure maintenance, are expected to have minor effects on available
10 Swainson’s hawk habitat and are expected to result in overall improvements to and
11 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but
12 are expected to be minimal and would be avoided and minimized by the AMMs listed below
13 (AMMs are described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the
14 Draft BDCP, AMM18 Swainson’s Hawk and an updated version of AMM6 Disposal and Reuse of
15 Spoils, Reusable Tunnel Material and Dredged Material is described in Appendix D, Substantive
16 BDCP Revisions, of this RDEIR/SDEIS). CM11 would also include the construction of recreational-
17 related facilities including trails, interpretive signs, and picnic tables (BDCP-see Chapter 4,
18 Covered Activities and Associated Federal Actions, of the Draft BDCP). The construction of
19 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
20 disturbed areas when and where possible. However, approximately 50 acres of Swainson’s
21 hawk grassland foraging habitat would be lost from the construction of trails and facilities.

- 22 • CM18 Conservation Hatcheries: Implementation of CM18 would remove up to 35 acres of
23 Swainson’s hawk foraging habitat for the development of a delta and longfin smelt conservation
24 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

25 •

- 26 • PPermanent and temporary nesting habitat losses from the above conservation measures,
27 would primarily consist of small, fragmented riparian stands. Temporarily affected nesting
28 habitat would be restored as riparian habitat within 1 year following completion of construction
29 activities as described in AMM10 Restoration of Temporarily Affected Natural Communities. The
30 restored riparian habitat would require 1 to several decades to functionally replace habitat that
31 has been affected and for trees to attain sufficient size and structure suitable for nesting by
32 Swainson’s hawks. AMM18 Swainson’s Hawk and White-Tailed Kite contains actions described
33 below to reduce the effect of temporal loss of nesting habitat, including the transplanting of
34 mature trees and planting of trees near high-value foraging habitat. The functions of cultivated
35 lands and grassland communities that provide foraging habitat for Swainson’s hawk are
36 expected to be restored relatively quickly (within 10-14 years of Alternative 4 implementation).

- 37 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
38 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
39 disturbances that could affect Swainson’s hawk use of the surrounding habitat. Maintenance
40 activities would include vegetation management, levee and structure repair, and re-grading of
41 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
42 and AMM18 Swainson’s Hawk and White-Tailed Kite in addition to conservation actions as
43 described below.

- 44 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
45 direct mortality of adult or fledged Swainson’s hawk if they were present in the study area,

1 because they would be expected to avoid contact with construction and other equipment.
2 However, if Swainson’s hawk were to nest in the construction area, construction-related
3 activities, including equipment operation, noise and visual disturbances could affect nests or
4 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
5 would be avoided and minimized with the incorporation of *AMM18 Swainson’s Hawk and White-*
6 *Tailed Kite* into the BDCP.

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 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 and/or restoration in an appropriate timeframe to ensure that
14 the effect of construction would not be adverse under NEPA. Alternative 4 would remove 342-339
15 acres (270-272 permanent, 72-67 temporary) of Swainson’s hawk nesting habitat in the study area
16 in the near-term. These effects would result from the construction of the water conveyance facilities
17 (CM1, 36-33 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
18 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
19 *Restoration*, and *CM7 Riparian Natural Community Restoration*—306 acres). In addition,
20 15,038-14,020 acres of Swainson’s hawk foraging habitat would be removed or converted in the
21 near-term (CM1, 5,634-5,153 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*
22 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural*
23 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
24 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
25 and *CM18 Conservation Hatcheries*—9,407 acres).

26 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
27 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3,
28 *Conservation Strategy*, of the *Draft* BDCP would be 1:1 for restoration/creation and 1:1 protection of
29 valley/foothill riparian habitat for nesting habitat, and 1:1 protection for foraging habitat. Using
30 these ratios would indicate that 36-33 acres of nesting habitat should be restored/ created and 36
31 33 acres should be protected to compensate for the CM1 losses of Swainson’s hawk nesting habitat.
32 In addition, 5,634-5,153 acres of foraging habitat should be protected to mitigate the CM1 losses of
33 Swainson’s hawk foraging habitat. The near-term effects of other conservation actions would
34 remove 306 acres of modeled nesting habitat, and therefore require 306 acres of restoration and
35 306 acres of protection of nesting habitat. Similarly, the near-term effects of other conservation
36 actions would remove 9,407 acres of modeled foraging habitat, and therefore require 9,407 acres of
37 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 restoration and 1:1
38 protection for the loss of nesting habitat; 1:1 protection for the loss of foraging habitat).

39 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
40 valley/foothill riparian natural community, 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, protecting 4,800 acres of managed wetland natural community,
43 and protecting 15,400 acres of non-rice cultivated lands (*see* Table 3-4 in Chapter 3, *Description of*

1 *Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3, CM5, CM7,
2 and CM8, and would occur in the same timeframe as the construction and early restoration losses.

3 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
4 system with extensive wide bands or large patches of valley/foothill riparian natural community
5 (Objectives VFRNC1.1 and VFRNC1.2 in *BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP*).
6 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
7 habitat for the species. The distribution and abundance of potential Swainson's hawk nest trees
8 would be increased by planting and maintaining native trees along roadsides and field borders
9 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
10 small but essential nesting habitat for Swainson's hawk associated with cultivated lands would also
11 be maintained and protected such as isolated trees, tree rows along field borders or roads, or small
12 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

13 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
14 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
15 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
16 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
17 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
18 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
19 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
20 Foraging opportunities would also be improved by enhancing prey populations through the
21 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
22 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
23 would also be protected and maintained as part of the cultivated lands reserve system which would
24 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
25 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
26 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
27 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
28 would inform the near-term protection and restoration efforts and represent performance
29 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
30 lands that provide habitat for covered and other native wildlife species would be protected in the
31 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
32 late long-term time period would be in very high- and high-value crop types for Swainson's hawk
33 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
34 lands protected in the near-term time period which would provide high-value habitat for Swainson's
35 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
36 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
37 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-
38 term effects of the other conservation measures.

39 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
40 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
41 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian
42 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
43 require one to several decades to functionally replace habitat that has been affected and for trees to
44 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between
45 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk
46 in the near-term time period. Nesting habitat is limited throughout much of the study area,

1 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
2 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
3 habitat would further reduce this limited resource and could reduce or restrict the number of active
4 Swainson's hawk nests within the study area until restored riparian habitat is sufficiently
5 developed.

6 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature
7 trees, including transplanting trees scheduled for removal. These would be supplemented with
8 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.
9 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.
10 In addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve
11 system for every tree anticipated to be removed by construction during the near-term period that
12 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species
13 would be planted to provide trees with differing growth rates, maturation, and life span. Trees
14 would be planted within the BDCP reserve system in areas that support high value foraging habitat
15 in clumps of at least 3 trees each at appropriate sites within or adjacent to conserved cultivated
16 lands, or they could be incorporated as a component of the riparian restoration (CM5, CM7) where
17 they are in close proximity to suitable foraging habitat. Replacement trees that were incorporated
18 into the riparian restoration would not be clustered in a single region of the study area, but would
19 be distributed throughout the lands protected as foraging habitat for Swainson's hawk.

20 To enhance Swainson's hawk and reproductive output until the replacement nest trees become
21 suitable for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected
22 in the near-term for each potential nest site removed (a nest site is defined as a 125-acre block in
23 which more than 50% of nest trees are 20 feet or greater in height) as a result of construction
24 activity during the near-term. The foraging habitat to be protected would be within 6 kilometers of
25 the removed tree within an otherwise suitable foraging landscape and on land not subject to threat
26 of seasonal flooding, construction disturbances, or other conditions that would reduce the foraging
27 value of the land. With this program in place, Alternative 4 would not have a substantial adverse
28 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through
29 habitat modifications.

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*, *and AMM10 Restoration of Temporarily Affected Natural*
35 *Communities*. All of these AMMs include elements that would avoid or minimize the risk of affecting
36 individuals and species habitats adjacent to work areas. The AMMs are described in detail in
37 *Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of*
38 *AMM6 is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix*
39 *3.C, Avoidance and Minimization Measures*.

40 **Late Long-Term Timeframe**

41 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
42 modeled foraging habitat for Swainson's hawk. Alternative 4 as a whole would result in the
43 permanent loss of and temporary effects on 533,530 acres of potential nesting habitat (5% of the
44 potential nesting habitat in the study area) and 55,682,55,194 acres of foraging habitat (12% of the
45 foraging habitat in the study area).

1 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
2 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
3 *Restoration, and CM8 Grassland Natural Community Restoration* to restore or create at least 5,000
4 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
5 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
6 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
7 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
8 species ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*).

9 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
10 system with extensive wide bands or large patches of valley/foothill riparian natural community
11 (Objectives VFRNC1.1 and VFRNC1.2 in [BDCP](#) Chapter 3, *Conservation Strategy, of the Draft BDCP*).
12 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
13 habitat for the species. The distribution and abundance of potential Swainson's hawk nest trees
14 would be increased by planting and maintaining native trees along roadsides and field borders
15 within protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition,
16 small but essential nesting habitat for Swainson's hawk associated with cultivated lands would also
17 be maintained and protected such as isolated trees, tree rows along field borders or roads, or small
18 clusters of trees in 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, 8, and 11 would be associated with vernal pool and alkali
21 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
22 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
23 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
24 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
25 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
26 Foraging opportunities would also be improved by enhancing prey populations through the
27 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
28 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
29 also be protected and maintained as part of the cultivated lands reserve system which would
30 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
31 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
32 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
33 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
34 would inform the near-term protection and restoration efforts and represent performance
35 standards for considering the effectiveness of restoration actions. Foraging habitat would be
36 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
37 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which
38 would be in very high-value habitat production in CZs 1-4, 7-9, and 11 (Objective SH1.2).

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, and AMM10 Restoration of Temporarily Affected Natural*
44 *Communities*. All of these AMMs include elements that would avoid or minimize the risk of affecting
45 individuals and species habitats adjacent to work areas. The AMMs are described in [Appendix 3.C,](#)
46 [Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM6 is](#)

1 [described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS detail in BDCP Appendix](#)
2 [3.C, Avoidance and Minimization Measures.](#)

3 **NEPA Effects:** The loss of Swainson’s hawk habitat and potential direct mortality of this special-
4 status species under Alternative 4 would represent an adverse effect in the absence of other
5 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
6 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, [AMM10](#), and
7 [AMM18 Swainson’s Hawk and White-Tailed Kite](#), which would be in place [during all project](#)
8 [activities throughout the construction period](#), the effects of habitat loss and potential mortality on
9 Swainson’s hawk under Alternative 4 would not be adverse.

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 and/or restoration in an appropriate timeframe to ensure that
15 the effect of construction would be less than significant under CEQA. Alternative 4 would remove
16 [342-339](#) acres ([270-272](#) permanent, [72-67](#) temporary) of Swainson’s hawk nesting habitat in the
17 study area in the near-term. These effects would result from the construction of the water
18 conveyance facilities (CM1, [36-33](#) acres), and implementing other conservation measures (*CM2 Yolo*
19 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
20 *Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community Restoration*—306 acres). In
21 addition, [15,038-14,020](#) acres of Swainson’s hawk foraging habitat would be removed or converted
22 in the near-term (CM1, [5,634-5,153](#) acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*
23 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural*
24 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
25 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
26 and *CM18 Conservation Hatcheries*—9,407 acres).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
28 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3,
29 [Conservation Strategy](#), of the [Draft](#) BDCP would be 1:1 for restoration/creation and 1:1 protection of
30 valley/foothill riparian habitat for nesting habitat, and 1:1 protection for foraging habitat. Using
31 these ratios would indicate that [36-33](#) acres of nesting habitat should be restored/ created and [36](#)
32 [33](#) acres should be protected to mitigate the CM1 losses of Swainson’s hawk nesting habitat. In
33 addition, [5,634-5,153](#) acres of foraging habitat should be protected to mitigate the CM1 losses of
34 Swainson’s hawk foraging habitat. The near-term effects of other conservation actions would
35 remove 306 acres of modeled nesting habitat, and therefore require 306 acres of restoration and
36 306 acres of protection of nesting habitat. Similarly, the near-term effects of other conservation
37 actions would remove 9,407 acres of modeled foraging habitat, and therefore require 9,407 acres of
38 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 restoration and 1:1
39 protection for the loss of nesting habitat; 1:1 protection for the loss of foraging habitat).

40 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
41 valley/foothill riparian natural community, 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, protecting 4,800 acres of managed wetland natural community,
44 and protecting 15,400 acres of non-rice cultivated lands ([see](#) Table 3-4 in Chapter 3, *Description of*

1 *Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3, CM5, CM7,
2 and CM8, and would occur in the same timeframe as the construction and early restoration losses.

3 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
4 system with extensive wide bands or large patches of valley/foothill riparian natural community
5 (Objectives VFRNC1.1 and VFRNC1.2 in *BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP*).
6 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
7 habitat for the species. The distribution and abundance of potential Swainson's hawk nest trees
8 would be increased by planting and maintaining native trees along roadsides and field borders
9 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
10 small but essential nesting habitat for Swainson's hawk associated with cultivated lands would also
11 be maintained and protected such as isolated trees, tree rows along field borders or roads, or small
12 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

13 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
14 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
15 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
16 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
17 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
18 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
19 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
20 Foraging opportunities would also be improved by enhancing prey populations through the
21 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
22 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
23 would also be protected and maintained as part of the cultivated lands reserve system which would
24 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
25 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
26 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
27 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
28 would inform the near-term protection and restoration efforts and represent performance
29 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
30 lands that provide habitat for covered and other native wildlife species would be protected in the
31 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
32 late long-term time period would be in very high- and high-value crop types for Swainson's hawk
33 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
34 lands protected in the near-term time period which would provide high-value habitat for Swainson's
35 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
36 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
37 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-
38 term effects of the other conservation measures.

39 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
40 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
41 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian
42 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
43 require one to several decades to functionally replace habitat that has been affected and for trees to
44 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between
45 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk
46 in the near-term time period. Nesting habitat is limited throughout much of the study area,

1 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
2 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
3 habitat would further reduce this limited resource and could reduce or restrict the number of active
4 Swainson's hawk within the study area until restored riparian habitat is sufficiently developed.

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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
12 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
13 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

14 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature
15 trees, including transplanting trees scheduled for removal. These would be supplemented with
16 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.
17 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.
18 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
19 system for every tree anticipated to be removed by construction during the near-term period that
20 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species
21 would be planted to provide trees with differing growth rates, maturation, and life span. Trees
22 would be planted within the BDCP reserve system in areas that support high value foraging habitat
23 in clumps of at least three trees each at appropriate sites within or adjacent to conserved cultivated
24 lands, or they may be incorporated as a component of the riparian restoration (CM5, CM7) where
25 they are in close proximity to suitable foraging habitat. Replacement trees that are incorporated into
26 the riparian restoration would not be clustered in a single region of the study area, but would be
27 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

28 To enhance Swainson's hawk reproductive output until the replacement nest trees become suitable
29 for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected in the
30 near-term for each potential nest site removed (a nest site is defined as a 125-acre block in which
31 more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity
32 during the near-term. The foraging habitat to be protected would be within 6 kilometers of the
33 removed tree within an otherwise suitable foraging landscape and on land not subject to threat of
34 seasonal flooding, construction disturbances, or other conditions that would reduce the foraging
35 value of the land. With this program in place, Alternative 4 would not have a substantial adverse
36 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through
37 habitat modifications. Therefore, Alternative 4 would have a less-than-significant impact on
38 Swainson's hawks.

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 **Late Long-Term Timeframe**

2 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
3 modeled foraging habitat for Swainson's hawk. Alternative 4 as a whole would result in the
4 permanent loss of and temporary effects on ~~533-530~~ acres of potential nesting habitat (5% of the
5 potential nesting habitat in the study area) and 55, ~~682-194~~ acres of foraging habitat (12% of the
6 foraging habitat in the study area).

7 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
8 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*
9 *Restoration*, and *CM8 Grassland Natural Community Restoration* to restore or create at least 5,000
10 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
11 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
12 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
13 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
14 species ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives*, [of this RDEIR/SDEIS](#)).

15 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
16 system with extensive wide bands or large patches of valley/foothill riparian natural community
17 (Objectives VFRNC1.1 and VFRNC1.2 in [BDCP](#) Chapter 3, *Conservation Strategy*, [of the Draft BDCP](#)).
18 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
19 habitat for the species. The distribution and abundance of potential Swainson's hawk 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 SH2.1). In addition,
22 small but essential nesting habitat for Swainson's hawk associated with cultivated lands would also
23 be maintained and protected such as isolated trees, tree rows along field borders or roads, or small
24 clusters of trees in 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, 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 foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
30 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
31 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
32 Foraging opportunities would also be improved by enhancing prey populations through the
33 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
34 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
35 also be protected and maintained as part of the cultivated lands reserve system which would
36 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
37 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
38 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
39 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
40 would inform the near-term protection and restoration efforts and represent performance
41 standards for considering the effectiveness of restoration actions. Foraging habitat would be
42 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
43 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which
44 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
8 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
9 *[RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

10 *[In the absence of other conservation actions, the effects on Swainson's hawk habitat from Alternative](#)*
11 *[4 would represent an adverse effect as a result of habitat modification and potential for direct](#)*
12 *[mortality of a special status species; however, considering](#)* Alternative 4's protection
13 and restoration provisions, which would provide acreages of new or enhanced habitat in amounts
14 greater than necessary to compensate for the time lag of restoring riparian and foraging habitats
15 lost to construction and restoration activities, and with implementation of AMM1–AMM7, *AMM10,*
16 *and AMM18 Swainson's Hawk and White-Tailed Kite,* the loss of habitat or direct mortality through
17 implementation of Alternative 4 would not result in a substantial adverse effect through habitat
18 modifications and would not substantially reduce the number or restrict the range of the species.
19 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
20 significant impact on Swainson's hawk.

21 **Impact BIO-84: Effects on Swainson's Hawk Associated with Electrical Transmission Facilities**

22 New transmission lines would increase the risk that Swainson's hawks could be subject to power
23 line strikes, which could result in injury or mortality of Swainson's hawks. This species would be at
24 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis
25 (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP*
26 *Transmission Lines*). Factors analyzed include the height of the new transmission lines and the flight
27 behavior of the species. The existing network of transmission lines in the study area currently poses
28 the same small risk for Swainson's hawk, and any incremental risk associated with the new power
29 line corridors would also be expected to be low. *[Marking transmission lines with flight diverters that](#)*
30 *[make the lines more visible to birds has been shown to dramatically reduce the incidence of bird](#)*
31 *[mortality \(Brown and Drewien 1995\). Yee \(2008\) estimated that marking devices in the Central](#)*
32 *[Valley could reduce avian mortality by 60%. All new project transmission lines would be fitted with](#)*
33 *[flight diverters. Bird flight diverters would make transmission lines highly visible to Swainson's](#)*
34 *[hawks and would further reduce any potential for powerline collisions.](#)* *AMM20 Greater Sandhill*
35 *Crane would further reduce any potential effects.*

36 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson's hawk power
37 line strikes. *[All new transmission lines constructed as a result of the project would be fitted with](#)*
38 *[bird diverters, which have been shown to reduce avian mortality by 60%. By implementing AMM20](#)*
39 *[Greater Sandhill Crane, the construction and operation of transmission lines would not result in an](#)*
40 *[adverse effect on Swainson's hawk.](#)* *~~With the implementation of AMM20 Greater Sandhill Crane the~~*
41 *~~potential effect of the construction of new transmission lines on Swainson's hawk would not be~~*
42 *~~adverse.~~*

43 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson's hawk
44 power line strikes. *[All new transmission lines constructed as a result of the project would be fitted](#)*

1 ~~with bird diverters, which have been shown to reduce avian mortality by 60%.By implementing~~
2 ~~AMM20 Greater Sandhill Crane, the construction and operation of transmission lines would result in~~
3 ~~a less-than-significant impact on Swainson's hawk.AMM20 Greater Sandhill Crane would reduce the~~
4 ~~potential impact of the construction of new transmission lines on Swainson's hawk to a less than-~~
5 ~~significant level.~~

6 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson's Hawk**

7 Noise and visual disturbances from the construction of water conveyance facilities and other
8 conservation measures could reduce Swainson's hawk use of modeled habitat adjacent to work
9 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to
10 5,250 feet from the edge of construction activities (~~Draft BDCP~~ Appendix 5.J, Attachment 5J.D,
11 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4 in
12 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS](#)), although there are no available data to
13 determine the extent to which these noise levels could affect Swainson's hawk. Moreover, operation
14 and maintenance of the water conveyance facilities, including the transmission facilities, could result
15 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the
16 surrounding habitat. These construction activities would include water conveyance construction,
17 tidal restoration activities, floodplain restoration, and Fremont Weir/Yolo Bypass Enhancements.
18 Swainson's hawks are seasonally abundant across much of the study area wherever adequate nest
19 trees occur within a cultivated landscape that supports suitable foraging habitat. There would be a
20 potential for noise and visual disturbances associated with BDCP actions to temporarily displace
21 Swainson's hawks and temporarily reduce the use of suitable habitat adjacent to construction areas.
22 These adverse effects would be minimized with the implementation of *AMM18 Swainson's Hawk* ~~and~~
23 *White-Tailed Kite*.

24 The use of mechanical equipment during water conveyance facilities construction could cause the
25 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in
26 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
27 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*
28 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that
29 measures are in place to prevent runoff from the construction area and negative effects of dust on
30 habitat.

31 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
32 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation
33 and maintenance of the water conveyance facilities, including the transmission facilities, could result
34 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the
35 surrounding habitat. Noise, the potential for hazardous spills, increased dust and sedimentation, and
36 operations and maintenance of the water conveyance facilities would not have an adverse effect on
37 Swainson's hawk with the implementation of AMM1-AMM7, [AMM10](#), and *AMM18 Swainson's Hawk*
38 *and White-Tailed Kite*.

39 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
40 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,
41 operation and maintenance of the water conveyance facilities, including the transmission facilities,
42 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's
43 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,
44 increased dust and sedimentation, and operations and maintenance of the water conveyance

1 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation
2 of AMM1-AMM7, AMM10, and ~~AMM18 Swainson's Hawk and White-Tailed Kite~~.

3 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging**
4 **Habitat as a Result of Implementation of Conservation Components**

5 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
6 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-
7 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41-70 acres of
8 nesting habitat and 3,025-6,635 acres of foraging habitat; Table 12-4-35). However, project-
9 associated inundation of areas that would not otherwise have been inundated would be expected to
10 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining
11 estimated 70% of all years, and during those years notch operations would not typically affect the
12 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
13 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat
14 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass
15 operations. However, increased duration of inundation during years of Fremont Weir operation,
16 may delay the period for which foraging habitat is available to Swainson's hawks by up to several
17 weeks.

18 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
19 *Restoration* could result in the periodic inundation of up to approximately 8,197 acres of modeled
20 Swainson's hawk habitat (Table 12-4-35), consisting of 189 acres of nesting and 8,008 acres of
21 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime
22 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.
23 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)
24 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated
25 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of
26 available foraging habitat due to the reduction in available prey. Inundated habitats would be
27 expected to recover following draw-down and provide suitable foraging conditions until the
28 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely
29 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

30 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
31 sites because trees in which nest sites are situated already withstand floods, the increase in
32 inundation frequency and duration is expected to remain within the range of tolerance of riparian
33 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
34 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
35 This would be considered a short-term effect that would not result in an adverse effect on
36 Swainson's hawk.

37 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
38 nest sites because trees in which nest sites are situated already withstand floods, the increase in
39 inundation frequency and duration is expected to remain within the range of tolerance of riparian
40 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
41 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
42 This would be considered a short-term effect that would have a less-than-significant impact on
43 Swainson's hawk.

1 Tricolored Blackbird

2 This section describes the effects of Alternative 4, including water conveyance facilities construction
 3 and implementation of other conservation components, on tricolored blackbird. The habitat model
 4 used to assess effects for tricolored blackbird is based on breeding habitat and nonbreeding habitat.
 5 Although nesting colonies have been documented along the fringe of Suisun Marsh, in the Yolo
 6 Bypass, and along the southwestern perimeter of the study area, and in the southeast corner of the
 7 study area near the San Joaquin River, breeding colonies are uncommon in the study area. Modeled
 8 breeding habitat includes bulrush/cattail wetlands and shrub communities that may provide
 9 suitable nesting substrate, and adjacent high-value foraging areas that occur within 5 miles of
 10 nesting colonies documented in the study area. The nesting component consists of nontidal
 11 freshwater perennial emergent marsh, and valley foothill riparian natural communities that occur
 12 within 5 miles of breeding colonies documented between 1998 and 2012. The foraging component
 13 includes cultivated lands and noncultivated land cover types known to support abundant insect
 14 populations such as grasslands, pasturelands (including alfalfa), natural seasonal wetlands, and
 15 sunflower croplands. The Delta is recognized as a major wintering area for tricolored blackbird
 16 (Hamilton 2004, Beedy 2008). Modeled nonbreeding habitat includes emergent wetlands and shrub
 17 stands that provide suitable roosting habitat, as well as cultivated lands and noncultivated lands that
 18 provide foods sought by tricolored blackbirds during the winter. Outside of the breeding season,
 19 tricolored blackbirds are primarily granivores that forage opportunistically across the study area in
 20 grasslands, pasturelands, croplands, dairies, and livestock feed lots. Factors considered in assessing
 21 the value of affected habitat for the tricolored blackbird, include patch size, suitability of vegetation,
 22 and proximity to recorded occurrences.

23 Construction and restoration associated with Alternative 4 conservation measures would result in
 24 both temporary and permanent losses of tricolored blackbird modeled breeding and nonbreeding
 25 habitat as indicated in Table 12-4-37. Full implementation of Alternative 4 would also include the
 26 following conservation actions over the term of the BDCP to benefit the tricolored blackbird (BDCP
 27 see Chapter 3, Section 3.3, Biological Goals and Objectives, of the Draft BDCP).

- 28 ● Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)
 29 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs
 30 1, 2, 8, or 11. (Objective TRBL1.1).
- 31 ● Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as
 32 nonbreeding foraging habitat, 50% of which is of high or very high value (Objective TRBL1.2).
- 33 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles
 34 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat
 35 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of this protected breeding-foraging habitat will
 36 be within 5 miles of the 50 acres of nesting habitat protected under Objective TRBL1.1
 37 (Objective TRBL1.3).
- 38 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
 39 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
 40 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
 41 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 42 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
 43 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
 44 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).

- 1 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 2 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
- 3 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 4 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
- 5 VPNC2.5, and GNC2.4, associated with CM11).

6 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 7 management activities that would enhance these natural communities for the species and
 8 implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird
 9 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

10 **Table 12-4-37. Changes to Tricolored Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	16	16	4	4	NA	NA
		Foraging - cultivated	1,430	1,430	190	190	NA	NA
		Foraging - noncultivated	311	311	92	92	NA	NA
	Nonbreeding	Roosting	10	10	31	31	NA	NA
		Foraging - cultivated	1,088	1,088	543	543	NA	NA
		Foraging - noncultivated	198	198	57	57	NA	NA
Total Impacts CM1		3,053	3,053	917	917			
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
Total Impacts CM2–CM18		7,150	38,526	368	1,044	2,711	5,766	
Total Breeding		4,131	13,345	600	906	2,447-4,312	2,509	
Total Nonbreeding		6,072	28,234	685	1,055	263-1,252	2,694	
TOTAL IMPACTS		10,203	41,579	1,285	1,961	2,711	5,766	

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
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							

1

2 **Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird**

3 Alternative 4 conservation measures would result in the combined permanent and temporary loss
 4 of up to ~~44,795~~~~43,540~~ acres of modeled habitat (14,200-251 acres of breeding habitat and up to
 5 ~~30,595~~~~29,289~~ acres of nonbreeding habitat) for tricolored blackbird (Table 12-4-37). Conservation
 6 measures that would result in these losses are conveyance facilities and transmission line
 7 construction, and establishment and use of ~~reusable tunnel material borrow and spoil~~ areas (CM1),
 8 Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5),
 9 riparian restoration (CM7), grassland restoration (CM8), marsh restoration (CM10), and
 10 construction of conservation hatcheries (CM18). Habitat enhancement and management activities
 11 (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local
 12 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
 13 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
 14 tricolored blackbird habitat. Each of these individual activities is described below. A summary
 15 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
 16 conservation measure discussions.

- 17 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
 18 facilities would result in the permanent loss of 1,646-757 acres of tricolored blackbird breeding
 19 habitat (~~4-16~~ acres nesting habitat, ~~1,429-430~~ acres of cultivated lands, and ~~213-311~~ acres of
 20 noncultivated lands suitable for foraging) and ~~2,592~~~~1,296~~ acres of nonbreeding habitat (~~19-10~~
 21 acres roosting habitat, ~~2,327~~~~1,088~~ acres of cultivated lands, and ~~245-198~~ acres of noncultivated
 22 lands suitable for foraging, Table 12-4-37). Approximately ~~847-771~~ of the 1,646-757 acres
 23 permanently impacted would be lost as reusable tunnel material storage areas, which would
 24 likely be moved to other sites for use in levee build-up and restoration, and the affected area
 25 would likely be restored. ~~While this effect is categorized as permanent because there is no~~
 26 ~~assurance that the material would eventually be moved, the effect would likely be temporary.~~
 27 In addition, CM1 would result in the temporary removal of ~~692-631~~ acres of breeding habitat (~~3~~
 28 ~~4~~ acres nesting habitat, ~~229-190~~ acres of cultivated lands, and ~~114-92~~ acres of noncultivated
 29 lands suitable for foraging) and ~~642-631~~ acres of nonbreeding habitat (~~20-31~~ acres roosting
 30 habitat, ~~575-543~~ acres of cultivated lands, and ~~47-57~~ acres of noncultivated lands suitable for
 31 foraging, Table 12-4-37).

32 Most of the habitat that would be lost is located in the central Delta, from CZs 3-6 and CZ 8.
 33 There are no occurrences of tricolored blackbird that overlap with the construction footprint for
 34 CM1. However, records exist throughout the study area. *AMM21 Tricolored Blackbird (Appendix*
 35 *3.C, Avoidance and Minimization Measures, of the Draft BDCP Appendix 3.C, Avoidance and*
 36 *Minimization Measures)* would minimize the effects of construction on nesting tricolored

1 blackbirds if present in the area. Refer to the Terrestrial Biology Map ~~B~~ook in [Appendix A of](#)
2 [this RDEIR/SDEIS](#) for a detailed view of Alternative 4 construction locations. Impacts from CM1
3 would occur within the ~~first 10 years~~[near-term timeframe](#) of Plan implementation.

- 4 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries
5 improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird
6 breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of
7 noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting
8 entirely of roosting habitat). In addition, CM2 construction would result in the temporary
9 removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands,
10 and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat
11 (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of
12 Alternative 4 implementation.
- 13 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
14 in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21
15 acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable
16 for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of
17 cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated
18 13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal
19 emergent wetland communities that could provide nonbreeding season roosting habitat for
20 tricolored blackbirds, depending on future vegetation density and composition. Conversion
21 would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34
22 acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated
23 habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated
24 lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and
25 conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent
26 loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop
27 into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored
28 blackbird.
- 29 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration
30 associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent
31 removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,
32 503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and
33 656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3
34 acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub
35 associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat
36 managed as early- to mid-successional habitats (as a component of CM5) could provide suitable
37 nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have
38 developed habitat functions for the species.
- 39 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland would result in the
40 permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding
41 habitat. Grassland restoration would be implemented on cultivated lands and would therefore
42 result in the conversion of tricolored blackbird cultivated foraging habitat to high-value
43 grassland foraging habitat in CZs 2, 4, and 5.
- 44 ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent
45 removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and

1 945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of
2 the restored nontidal marsh would be open water, and the remainder would support emergent
3 wetland vegetation that could provide ~~low-value~~ roosting habitat for tricolored blackbird
4 depending on vegetation density and composition.

- 5 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
6 actions that are designed to enhance wildlife values in BDCP-protected habitats could result in
7 localized ground disturbances that could temporarily remove small amounts of tricolored
8 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
9 road and other infrastructure maintenance, would be expected to have minor effects on
10 available tricolored blackbird habitat and are expected to result in overall improvements to and
11 maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects
12 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
13 the AMMs listed below ([AMMs are described in detail in Appendix 3.C, Avoidance and](#)
14 [Minimization Measures, of the Draft BDCP, and an updated version of AMM6 Disposal and Reuse](#)
15 [of Spoils, Reusable Tunnel Material and Dredged Material is described in Appendix D, Substantive](#)
16 [BDCP Revisions, of this RDEIR/SDEIS](#)). CM11 would also include the construction of recreational-
17 related facilities including trails, interpretive signs, and picnic tables ([BDCP-see Chapter 4,](#)
18 [Covered Activities and Associated Federal Actions, of the Draft BDCP](#)). Trailhead facilities, signs,
19 staging areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when
20 and where possible. [Surveys would be conducted under AMM21 Tricolored Blackbird to ensure](#)
21 [that areas identified for recreational development did not contain active breeding or foraging](#)
22 [tricolored blackbirds \(Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP\)](#).
23 However, approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all
24 grassland suitable for foraging) would be lost as a result of construction of trails and facilities.
25 Impacts from recreational-related facilities that would occur within the first 10 years of
26 Alternative 4 implementation would include a loss of 13 acres of breeding habitat.
- 27 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
28 tricolored blackbird grassland foraging habitat in CZ 1.
- 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 tricolored blackbird use of the surrounding habitat in or adjacent
32 to work areas. Maintenance activities would include vegetation management, levee and
33 structure repair, and re-grading of roads and permanent work areas. These effects, however,
34 would be reduced by AMMs and conservation actions as described below.
- 35 • *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or
36 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to
37 land clearing activities, nest abandonment, or increased exposure to the elements or to
38 predators. Injury to or mortality of adults and fledged juveniles would not be expected as
39 individuals would be expected to avoid contact with construction equipment. Construction
40 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,
41 contouring, and other initial ground-disturbing operations that could temporarily reduce the
42 extent and functions supported by the affected habitat. To the maximum extent practicable,
43 construction activity will be avoided up to 1,300 feet, but not less than a minimum of ~~250~~300
44 feet, from an active tricolored blackbird nesting colony. If monitoring determines an activity is
45 adversely affecting a nesting colony, construction will be modified, as practicable, by either
46 delaying construction until the colony site is abandoned or until the end of the breeding season,

1 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access
2 to the construction site. These measures to avoid injury or mortality of nesting tricolored
3 blackbirds are described in *AMM21 Tricolored Blackbird* ([see Appendix 3.C, Avoidance and](#)
4 [Minimization Measures, of the Draft BDCP Appendix 3.C, Avoidance and Minimization Measures](#)).

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 also
7 included.

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 or restoration in an appropriate timeframe to ensure that the
12 effects of construction would not be adverse under NEPA. Alternative 4 would remove [4,680-731](#)
13 acres of breeding habitat ([95-108](#) acres of nesting, [3,399-361](#) acres of cultivated lands, and [1,186](#)
14 [262](#) acres of noncultivated lands suitable for foraging) and [8,0636,757](#) acres of nonbreeding habitat
15 ([610-611](#) acres of roosting, [6,705,4322](#) acres of cultivated lands, and [751-714](#) acres of noncultivated
16 lands suitable for foraging) for tricolored blackbird in the study area in the near-term. These effects
17 would result from the construction of the water conveyance facilities (CM1, [1,9922,043](#) acres of
18 breeding, [3,2331,927](#) acres of nonbreeding), and implementing other conservation measures (CM2
19 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
20 *Inundated Floodplain Restoration*, and CM7 *Riparian Natural Community Restoration*—2,688 acres of
21 breeding, 4,830 acres of nonbreeding).

22 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
23 1:1 for protection for the loss of nesting and roosting wetland habitat, [1:1 protection for the loss of](#)
24 [cultivated lands, and](#) 2:1 protection for loss of noncultivated lands suitable for foraging ~~(for the~~
25 ~~breeding and nonbreeding season), and 1:1 protection for the loss of cultivated lands.~~

26 Using these ratios would indicate that the compensation for loss or conversion of tricolored
27 blackbird habitat from CM1 would require [7-20](#) acres of restoration and [7-20](#) acres of protection of
28 nesting habitat, [40-41](#) acres of restoration and [40-41](#) acres of protection of roosting habitat,
29 [1,2383,251](#) acres of protection of ~~non~~cultivated lands that provide foraging habitat, [and 1,3161,658](#)
30 acres of protection of ~~non~~cultivated lands suitable for foraging ~~during the breeding season, and~~
31 ~~2,901 acres of cultivated lands that provide foraging habitat during the nonbreeding season.~~ The
32 near-term effects of other conservation actions would remove or convert 88 acres of nesting habitat,
33 570 acres of roosting habitat, [5,542 acres of cultivated lands, and 619-1,318](#) acres of noncultivated
34 lands suitable for foraging, ~~1,741 acres of cultivated lands that provide foraging habitat during the~~
35 ~~breeding season, and 3,801 acres of cultivated lands during the nonbreeding season.~~ Compensation
36 for these losses from other conservation measures would therefore require 88 acres of restoration
37 and 88 acres of protection of nesting habitat, 570 acres of restoration and 570 acres of protection of
38 roosting habitat, ~~1,238 acres of protection of noncultivated lands that provide foraging habitat,~~
39 ~~1,741 acres of protection of cultivated lands suitable for foraging during the breeding season, and~~
40 ~~3,801~~[5,542](#) acres of cultivated lands that provide foraging habitat, [and 2,636 acres of noncultivated](#)
41 [lands during the nonbreeding season. using the same typical NEPA and CEQA ratios.](#)

42 Total compensation for near-term loss or conversion of tricolored blackbird ~~habitat (from the~~
43 [implementation of all conservation measures\) that would be](#) required using the typical ratios above
44 would be [95-108](#) acres of restoration and [95-108](#) acres of protection for nesting habitat, [610-611](#)

1 acres of restoration and ~~610-611~~ acres of protection for roosting habitat, ~~3,8738,793~~ acres of
2 protection of ~~non~~cultivated foraging habitat, ~~3,399 acres of protection for cultivated lands that~~
3 ~~provide foraging habitat during the breeding season,~~ and ~~6,7023,952~~ acres of ~~non~~cultivated lands
4 that provide foraging habitat ~~during the nonbreeding season.~~

5 The BDCP has committed to near-term goals of protecting 25 acres ~~of nontidal marsh, and restoring~~
6 ~~protecting~~ 750 acres ~~of valley/foothill riparian, 2,000 acres of grassland, 400 acres of vernal pool~~
7 ~~complex, 120 acres of alkali seasonal wetland complex, 4,800 acres of managed wetland, 15,400~~
8 ~~acres of non-rice cultivated lands, and 900 acres of rice (or rice-equivalent wetlands such as~~
9 ~~nontidal marsh). In addition, and restoring the restoration of~~ 800 acres of valley/foothill riparian,
10 ~~natural community, protecting 2,000 acres and restoring~~ 1,140 acres of grassland, ~~natural~~
11 ~~community, protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal~~
12 ~~wetland complex, protecting 4,800 acres of managed wetland natural community, protecting 15,400~~
13 ~~acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent habitat, restoring~~
14 8,850 acres of tidal freshwater emergent wetlands, and 2,000 acres of tidal brackish emergent
15 wetlands would be initiated in the near-term timeframe (see Table 3-4 in Chapter 3, *Description of*
16 *Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3, CM4, CM5,
17 CM7, and CM8 and would occur in the same timeframe as the construction and early restoration
18 losses. Some proportion of these natural communities provide suitable habitat for tricolored
19 blackbird as described below.

20 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
21 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
22 wetland, in close association with highly productive foraging areas that support abundant insect
23 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
24 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
25 1, 2, 8, or 11 (see Table 12-4-38 for foraging habitat values) and would be actively managed to
26 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
27 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
28 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
29 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
30 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
31 blackbird. The Plan estimates that modeled nesting habitat in the study area currently includes 8%
32 of valley/foothill riparian and 22% of nontidal freshwater emergent marsh (~~BDCP-see~~ Chapter 5,
33 Section 5.6.12.2, *Beneficial Effects, of the Draft BDCP*). Assuming similar proportions of modeled
34 habitat on conservation lands restored in the near-term, approximately 64 acres of valley foothill
35 riparian and 198 acres of nontidal marsh restored would provide nesting habitat for tricolored
36 blackbird.

1 **Table 12-4-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season ^a Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands, <u>unsprayed alfalfa, unsprayed sunflower, unsprayed mixed alfalfa</u>	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, <u>native vegetation^b</u> ,
Moderate	Miscellaneous grasses es-pasture , fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots, <u>organic rice</u>	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Wheat, mixed <u>Mixed</u> grain and hay crops, farmsteads, <u>non-irrigated mixed grain and hay, farm residences</u>	Wheat, oats, mixed grain and hay, farmsteads, <u>non-irrigated mixed grain and hay, and on-irrigated misc. grain and hay</u>
Marginal	Rice	None
None	All remaining crop types	All remaining crop types

^a Generally March through August; occasional breeding in fall (September through November).

^b Native vegetation is a land use designation within the California Department of Water Quality crop type dataset (2007). For the purposes of incorporating native vegetation classes into the correct species models, and, when applicable, assigning habitat foraging values, the management on these lands most resembles that of grassland or a nonirrigated pasture type.

2

3 The Plan estimates that modeled roosting habitat in the study area currently includes 95% of tidal
 4 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
 5 75% of nontidal marsh, and 15% of managed wetlands (BDCP-see Chapter 5, Section 5.6.12.2,
 6 Beneficial Effects, of the Draft BDCP). Assuming similar proportions of modeled habitat on
 7 conservation lands restored in the near-term, the restoration of approximately 8,408 acres of tidal
 8 freshwater emergent wetland, 1,140 acres of tidal brackish emergent wetland, 675 acres of nontidal
 9 marsh, and 168 acres of valley foothill riparian would provide 10,391 acres of nesting habitat for
 10 tricolored blackbird. An estimated 878 acres of roosting habitat would also be protected in the near-
 11 term time period (158 acres of valley/foothill riparian, 720 acres managed wetland).

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) which would result in a
 15 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
 16 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
 17 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
 18 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
 19 reproductive success in tricolored blackbirds. These natural communities are known to support
 20 large insect populations, a vital food resource for successful rearing and fledging of young. Those

1 conservation lands that lie within a few miles of active nesting colonies would provide high-value
2 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
3 *Enhancement and Management*, insect prey populations would be increased on protected lands,
4 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
5 and GNC2.4).

6 Cultivated lands that provide habitat for covered and other native wildlife species would provide
7 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
8 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
9 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
10 term. Assuming that lands would be protected proportional to the conservation objectives for
11 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
12 consisting of cultivated lands would be protected in the near-term. These lands would be protected
13 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
14 7, 8, or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
15 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
16 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
17 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
18 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
19 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
20 habitats for species including tricolored blackbird would also be protected that occur within the
21 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
22 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
23 tricolored blackbird (Objective CLNC1.3).

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
31 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
32 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

33 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
34 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
35 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
36 near-term impacts from other conservation measures on nesting, roosting, and ~~cultivated lands~~
37 foraging habitat. ~~The 3,660 acres of grassland protection in the near term are 213 acres short of the~~
38 ~~2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for~~
39 ~~by this acreage and temporary impacts on grassland would be restored to preproject conditions~~
40 ~~(including revegetation with native vegetation if within 1 year of completion of construction under~~
41 ~~AMM2 Construction Best Management Practices and Monitoring.~~ With the ~~enhancement protection~~
42 ~~and restoration acres described above, and the implementation of AMM1-7 and AMM21, of~~
43 ~~grasslands described above, and the restoration of temporary habitat impacts, this difference~~
44 ~~between impacted and conserved grassland acreages potential impacts of Plan implementation~~ in
45 the near-term time period would not result in an adverse effect on tricolored blackbird.

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-see Chapter 5, Effects](#)
 8 [Analysis, of the Draft BDCP](#)). Alternative 4 as a whole would result in the permanent loss of and
 9 temporary effects on ~~14,200-251~~ acres of breeding habitat and ~~30,595-29,289~~ acres of nonbreeding
 10 habitat for tricolored blackbird during the term of the Plan (9% of the total breeding habitat in the
 11 study area and ~~1-211~~% of the total nonbreeding habitat in the study area). The locations of these
 12 losses are described above in the 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 ([see Table 3-4 in Chapter 3, Description of](#)
 21 [Alternatives, of this RDEIR/SDEIS](#)). In addition, species specific biological goals and objectives for
 22 tricolored blackbird commit to protecting or restoring at least 50 acres of occupied or recently
 23 occupied (within the last 15 years) tricolored blackbird nesting habitat located within 5 miles of
 24 high-value foraging habitat in CZs 1, 2, 8, or 11 (Objective TRBL1.1). Foraging habitat value classes
 25 for tricolored blackbird are found in Table 12-4-38. To ensure that natural community conservation
 26 benefits tricolored blackbird, the Plan further specifies that cultivated lands protected for tricolored
 27 blackbird retain residual wetland, grassland patches, shrub stands, and herbaceous edge habitats
 28 which may provide suitable nesting, foraging or roosting habitat for the species (Objective CLNC1.3).
 29 In addition, 26,300 acres of moderate-, high-, or very high-value cultivated lands would be
 30 conserved and managed as nonbreeding foraging habitat, 50% of which would be of high- or very
 31 high-value (Objective TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very
 32 high breeding foraging habitat would be conserved within 5 miles of occupied or recently occupied
 33 (within the last 15 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective
 34 TRBL1.2). Most of the loss of breeding and nonbreeding habitat would be to cultivated lands that are
 35 abundant throughout the study area, so the loss is not expected to adversely affect the population in
 36 the study area.

37 The BDCP's beneficial effects analysis ([BDCP-see Chapter 5, Section 5.6, Effects on Covered Wildlife](#)
 38 [and Plant Species, of the Draft BDCP](#)) estimates that the restoration and protection actions discussed
 39 above could result in the protection of an estimated 46,566 acres of tricolored blackbird habitat
 40 (16,476 acres breeding habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001
 41 acres of tricolored blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding
 42 habitat).

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 45 *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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
 5 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
 6 *[RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

7 **NEPA Effects:** The losses of tricolored blackbird habitat and potential direct mortality of a special-
 8 status species under Alternative 4 would represent an adverse effect in the absence of other
 9 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,
 10 CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1–AMM7
 11 and *AMM21 Tricolored Blackbird*, which would be in place [during all project activities throughout the](#)
 12 [construction period](#), the effects of habitat loss or potential mortality on tricolored blackbird under
 13 Alternative 4 would not be adverse.

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 CEQA. Alternative 4 would remove ~~4,680~~
 20 [731](#) acres of breeding habitat (~~95-108~~ acres of nesting, ~~3,399-361~~ acres of cultivated lands, and
 21 ~~1,186-262~~ acres of noncultivated lands suitable for foraging) and ~~8,0636,757~~ acres of nonbreeding
 22 habitat (~~610-611~~ acres of roosting, ~~6,7025,432~~ acres of cultivated lands, and ~~751-714~~ acres of
 23 noncultivated lands suitable for foraging) for tricolored blackbird in the study area in the near-term.
 24 These effects would result from the construction of the water conveyance facilities (CM1,
 25 ~~1,9922,043~~ acres of breeding, ~~3,2331,927~~ acres of nonbreeding), and implementing other
 26 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
 27 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*
 28 *Restoration—2,688 acres of breeding, 4,830 acres of nonbreeding).*

29 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
 30 1:1 for protection for the loss of nesting and roosting wetland habitat, [1:1 protection for the loss of](#)
 31 [cultivated lands, and 2:1 protection for loss of noncultivated lands suitable for foraging](#) (~~for the~~
 32 ~~breeding and nonbreeding season), and 1:1 protection for the loss of cultivated lands.~~

33 Using these ratios would indicate that the compensation for loss or conversion of tricolored
 34 blackbird habitat from CM1 would require ~~7-20~~ acres of restoration and ~~7-20~~ acres of protection of
 35 nesting habitat, ~~40-41~~ acres of restoration and ~~40-41~~ acres of protection of roosting habitat,
 36 ~~1,2383,251~~ acres of protection of ~~non~~cultivated lands that provide foraging habitat, ~~and 1,658~~ acres
 37 of protection of ~~non~~cultivated lands suitable for foraging ~~during the breeding season, and 2,901~~
 38 ~~acres of cultivated lands that provide foraging habitat during the nonbreeding season.~~ The near-
 39 term effects of other conservation actions would remove or convert 88 acres of nesting habitat, 570
 40 acres of roosting habitat, ~~5,542 acres of cultivated lands, and 1,318 acres of noncultivated lands~~
 41 ~~suitable for foraging~~ ~~619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated~~
 42 ~~lands that provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands~~
 43 ~~during the nonbreeding season.~~ Compensation for these losses from other conservation measures
 44 would therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570

1 acres of restoration and 570 acres of protection of roosting habitat, 5,542 acres of cultivated lands
2 that provide foraging habitat, and 2,636 acres of noncultivated lands ~~1,238 acres of protection of~~
3 ~~noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands~~
4 ~~suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide~~
5 ~~foraging habitat during the nonbreeding season.~~ using the same typical NEPA and CEQA ratios.

6 Total compensation for near-term loss or conversion of tricolored blackbird habitat (from the
7 implementation of all conservation measures) that would be required using the typical ratios above
8 would be 108 acres of restoration and 108 acres of protection for nesting habitat, 611 acres of
9 restoration and 611 acres of protection for roosting habitat, 8,793 acres of protection of cultivated
10 foraging habitat, and 3,952 acres of noncultivated lands that provide foraging habitat.

11 ~~Total compensation for near-term loss or conversion of tricolored blackbird required using the~~
12 ~~typical ratios above would be 95 acres of restoration and 95 acres of protection for nesting habitat,~~
13 ~~610 acres of restoration and 610 acres of protection for roosting habitat, 3,873 acres of protection of~~
14 ~~noncultivated foraging habitat, 3,399 acres of protection for cultivated lands that provide foraging~~
15 ~~habitat during the breeding season, and 6,702 acres of cultivated lands that provide foraging habitat~~
16 ~~during the nonbreeding season.~~

17 The BDCP has committed to near-term goals of protecting 25 acres of nontidal marsh, 750 acres of
18 valley/foothill riparian, 2,000 acres of grassland, 400 acres of vernal pool complex, 120 acres of
19 alkali seasonal wetland complex, 4,800 acres of managed wetland, 15,400 acres of non-rice
20 cultivated lands, and 900 acres of rice (or rice-equivalent wetlands such as nontidal marsh). In
21 addition, the restoration of 800 acres of valley/foothill riparian, 1,140 acres of grassland, 8,850
22 acres of tidal freshwater emergent wetlands, and 2,000 acres of tidal brackish emergent wetlands
23 would be initiated in the near-term timeframe and restoring protecting 750 acres and restoring 800
24 acres of valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres
25 of grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres
26 of alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
27 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
28 habitat, restoring 8,850 acres of tidal freshwater emergent wetlands and 2,000 acres of tidal
29 brackish emergent wetlands (see Table 3-4 in Chapter 3, *Description of Alternatives*, of this
30 RDEIR/SDEIS). These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and
31 would occur in the same timeframe as the construction and early restoration losses. Some
32 proportion of these natural communities provide suitable habitat for tricolored blackbird as
33 described below.

34 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
35 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
36 wetland, in close association with highly productive foraging areas that support abundant insect
37 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
38 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
39 1, 2, 8, or 11 (see Table 12-4-38 for foraging habitat values) and would be actively managed to
40 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
41 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
42 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
43 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
44 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
45 blackbird. The Plan estimates that modeled nesting habitat in the study area currently includes 8%

1 of valley/foothill riparian and 22% of nontidal freshwater emergent marsh ([BDCP-see Chapter 5,](#)
 2 [Section 5.6.12.2, Beneficial Effects, of the Draft BDCP](#)). Assuming similar proportions of modeled
 3 habitat on conservation lands restored in the near-term, approximately 64 acres of valley foothill
 4 riparian and 198 acres of nontidal marsh restored would provide nesting habitat for tricolored
 5 blackbird.

6 The Plan estimates that modeled roosting habitat in the study area currently includes 95% of tidal
 7 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
 8 75% of nontidal marsh, and 15% of managed wetlands ([BDCP-see Chapter 5, Section 5.6.12.2,](#)
 9 [Beneficial Effects, of the Draft BDCP](#)). Assuming similar proportions of modeled habitat on
 10 conservation lands restored in the near-term, the restoration of approximately 8,408 acres of tidal
 11 freshwater emergent wetland, 1,140 acres of tidal brackish emergent wetland, 675 acres of nontidal
 12 marsh, and 168 acres of valley foothill riparian would provide 10,391 acres of nesting habitat for
 13 tricolored blackbird. An estimated 878 acres of roosting habitat would also be protected in the near-
 14 term time period (158 acres of valley/foothill riparian, 720 acres managed wetland).

15 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 16 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 17 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
 18 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
 19 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
 20 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
 21 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
 22 reproductive success in tricolored blackbirds. These natural communities are known to support
 23 large insect populations, a vital food resource for successful rearing and fledging of young. Those
 24 conservation lands that lie within a few miles of active nesting colonies would provide high-value
 25 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
 26 *Enhancement and Management*, insect prey populations would be increased on protected lands,
 27 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
 28 and GNC2.4).

29 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 30 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
 31 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
 32 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
 33 term. Assuming that lands would be protected proportional to the conservation objectives for
 34 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
 35 consisting of cultivated lands would be protected in the near-term. These lands would be protected
 36 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
 37 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
 38 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
 39 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
 40 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
 41 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
 42 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
 43 habitats for species including tricolored blackbird would also be protected that occur within the
 44 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
 45 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
 46 tricolored blackbird (Objective CLNC1.3).

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
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9 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

10 [In the absence of other conservation actions, the effects on tricolored blackbird habitat from](#)
11 [Alternative 4 would represent an adverse effect as a result of habitat modification and potential for](#)
12 [direct mortality of a special-status species.](#) The acres of protection and restoration contained in the
13 near-term Plan goals, in addition to the detailed habitat value goals that would be applied to near-
14 term acres, are more than sufficient to satisfy the typical mitigation ratios that would be applied to
15 the project-level effects of CM1 and the near-term impacts from other conservation measures on
16 nesting, roosting, and cultivated lands foraging habitat. [With the protection and restoration acres](#)
17 [described above, and the implementation of AMM1-7 and AMM21, potential impacts of Plan](#)
18 [implementation. 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 result in a less-
25 than-significant impact on tricolored blackbird.

26 **Late Long-Term Timeframe**

27 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
28 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
29 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
30 breeding habitat available, the study area does not currently support many nesting tricolored
31 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
32 Bypass, and along the southwestern perimeter of the study area ([BDCP-see Chapter 5, Effects](#)
33 [Analysis, of the Draft BDCP](#)). Alternative 4 as a whole would result in the permanent loss of and
34 temporary effects on ~~14,200-251~~ acres of breeding habitat and ~~30,595-29,289~~ acres of nonbreeding
35 habitat for tricolored blackbird during the term of the Plan (9% of the total breeding habitat in the
36 study area and ~~1211~~% of the total nonbreeding habitat in the study area). The locations of these
37 losses are described above in the analyses of individual conservation measures.

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
39 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
40 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
41 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
42 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
43 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
44 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that

1 provide suitable habitat for native wildlife species ([see](#) Table 3-4 in Chapter 3, *Description of*
2 *Alternatives, of this RDEIR/SDEIS*).

3 Species specific biological goals and objectives for tricolored blackbird commit to protecting or
4 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
5 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
6 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-4-
7 38. To ensure that natural community conservation benefits tricolored blackbird, the Plan further
8 specifies that cultivated lands protected for tricolored blackbird retain residual wetland, grassland
9 patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting, foraging
10 or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of moderate-, high-,
11 or very high-value cultivated lands would be conserved and managed as nonbreeding foraging
12 habitat, 50% of which would be of high- or very high-value (Objective TRBL1.2). At least 11,050
13 acres of cultivated lands managed as high to very high breeding foraging habitat would be conserved
14 within 5 miles of occupied or recently occupied (within the last 15 years) tricolored blackbird
15 nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of the loss of breeding and
16 nonbreeding habitat would be to cultivated lands that are abundant throughout the study area, so
17 the loss is not expected to adversely affect the population in the study area.

18 The BDCP's beneficial effects analysis (~~BDCP~~[see](#) Chapter 5, Section 5.6, *Effects on Covered Wildlife*
19 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
20 above could result in the protection of an estimated 46,566 acres of tricolored blackbird habitat
21 (16,476 acres breeding habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001
22 acres of tricolored blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding
23 habitat).

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
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33 [In the absence of other conservation actions, the effects on tricolored blackbird habitat from](#)
34 [Alternative 4 would represent an adverse effect as a result of habitat modification and potential for](#)
35 [direct mortality of a special-status species](#). Considering Alternative 4's protection and restoration
36 provisions, which would provide acreages of new or enhanced habitat in amounts greater than
37 necessary to compensate for habitats lost to construction and restoration activities, and with
38 implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*, the loss of habitat or direct
39 mortality though the implementation of Alternative 4 as a whole would not result in a substantial
40 adverse effect through habitat modifications and would not substantially reduce the number or
41 restrict the range of the species. Therefore, the alternative would have a less-than-significant impact
42 on tricolored blackbird.

1 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission**
2 **Facilities**

3 New transmission lines would increase the risk that tricolored blackbirds could be subject to power
4 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would
5 have the potential to intersect the proposed transmission lines largely due to winter movements
6 throughout the study area, when individuals are migrating in large flocks and dense fog is common
7 in the area. Although migratory movements and daily flights between roosting and foraging habitat
8 make tricolored blackbird vulnerable to collision with transmission lines ~~may increase the risk of~~
9 ~~strike hazard~~, daily flights associated with winter foraging likely occurs in smaller flocks at heights
10 that are lower than the transmission lines (BDCP Attachment 5.J-2, *Memorandum: Analysis of*
11 *Potential Bird Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with
12 flight diverters that make the lines more visible to birds has been shown to dramatically reduce the
13 incidence of bird mortality (Brown and Drewien 1995). For example, Yee (2008) estimated that
14 marking devices in the Central Valley could reduce avian mortality by 60%. As described in AMM20
15 Greater Sandhill Crane, all new project transmission lines would be fitted with flight diverters which
16 would further reduce any potential for tricolored blackbird collision with transmission lines.

17 Transmission line poles and towers provide perching substrate for raptors, which are predators on
18 tricolored blackbird. Although there is potential for transmission lines to result in increased
19 perching opportunities for raptors and result in increased predation pressure on tricolored
20 blackbirds ~~which could result in increased predation pressure on local tricolored blackbirds~~. The
21 existing network of transmission lines in the study area currently poses these risks and any
22 incremental risk associated with the new power line corridors would not be expected to affect the
23 study area population. Therefore, it is assumed that the increase in predation risk on tricolored
24 blackbird from an increase in raptor perching opportunities is minimal. ~~AMM20 Greater Sandhill~~
25 ~~Crane, would further reduce any potential effects of transmission lines on tricolored blackbird.~~

26 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline
27 strikes, primarily during daily flights between roosting and foraging sites and during in-winter
28 during migration movements. ~~AMM20 Greater Sandhill Crane~~ contains the commitment to place bird
29 strike diverters on all new powerlines, which would reduce the potential impact of the construction
30 of new transmission lines on tricolored blackbird. The increase in predation risk on tricolored
31 blackbird from an increase in raptor perching opportunities is considered minimal. Therefore, the
32 construction and operation of new transmission lines under Alternative 4 and would not result in an
33 adverse effect on ~~the species~~ tricolored blackbird.

34 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird
35 powerline strikes, primarily in winter during daily flights between roosting and foraging sites and
36 during migration movements. ~~AMM20 Greater Sandhill Crane~~ contains the commitment to place bird
37 strike diverters on all new powerlines, which would reduce the potential impact of the construction
38 of new transmission lines on tricolored blackbird. The increase in predation risk on tricolored
39 blackbird from an increase in raptor perching opportunities is considered minimal. The construction
40 and operation of new transmission lines under Alternative 4 would not substantially reduce the
41 number or restrict the range of the species and would therefore result in ~~to~~ a less-than-significant
42 level ~~impact~~ on tricolored blackbird.

1 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

2 **Indirect construction- and operation-related effects:** Tricolored blackbird nesting habitat within
 3 the vicinity of proposed construction areas that could be indirectly affected by construction
 4 activities. Construction noise above background noise levels (greater than 50 dBA) could extend 500
 5 to 5,250 feet from the edge of construction activities ([Draft BDCP-Appendix 5.J, Attachment 5J.D,](#)
 6 [Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane, Table 4 in](#)
 7 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS](#)), although there are no available data to
 8 determine the extent to which these noise levels could affect tricolored blackbird. Indirect effects
 9 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
 10 contouring, and other ground-disturbing operations outside the project footprint but within 1,300
 11 feet from the construction edge. Construction and subsequent maintenance-related noise and visual
 12 disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of
 13 suitable nesting habitat for these species. *AMM21 Tricolored Blackbird* would require
 14 preconstruction surveys, and if detected, covered activities would be avoided within a minimum ~~250~~
 15 ~~300~~ feet of an active nesting colony and up to 1,300 feet where practicable until breeding has
 16 ceased. In addition, monitoring would be implemented to ensure that construction does not
 17 adversely affect the nesting colony. The use of mechanical equipment during water conveyance
 18 facilities construction could cause the accidental release of petroleum or other contaminants that
 19 could affect tricolored blackbird in the surrounding habitat. The inadvertent discharge of sediment
 20 or excessive dust adjacent to tricolored blackbird habitat could also affect the species. *AMM1–*
 21 *AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
 22 the likelihood of such spills and ensure that measures are in place to prevent runoff from the
 23 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 tricolored blackbird. Marsh (tidal and nontidal) and floodplain
 26 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
 27 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
 28 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
 29 restoration activities that create newly inundated areas could increase bioavailability of mercury
 30 (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration).

31 ~~The potential mobilization or creation of methylmercury within the study area varies with site-~~
 32 ~~specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*~~
 33 ~~*Management* contains provisions for project-specific Mercury Management Plans.~~ Breeding
 34 tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure because
 35 tidal wetlands are not expected to be a major foraging area for the species. Furthermore, the Suisun
 36 Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored under the
 37 plan would generate less methylmercury than the existing managed wetlands, potentially reducing
 38 the overall risk. However, species sensitivity to methylmercury differs widely and there is a large
 39 amount of uncertainty with respect to species-specific effects and increased methylmercury
 40 associated with natural community and floodplain restoration could indirectly affect tricolored
 41 blackbird, via uptake in lower trophic levels (as described in [the BDCP, Appendix 5.D, Contaminants,](#)
 42 [of the Draft BDCP](#)). [A detailed review of the methylmercury issues associated with implementation](#)
 43 [of the BDCP areis contained in Appendix XD, Substantive BDCP Revisions, of this RDEIR/SDEIS,](#)
 44 [which This review includes an overview of the BDCP-related mechanisms that could result in](#)
 45 [increased mercury in the food web, and how exposure to individual species may occur based on](#)

1 feeding habits and where their habitat overlaps with the areas where mercury bioavailability could
2 increase.

3 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
4 into the foodweb, CM12 Methylmercury Management (as revised in Appendix D, Substantive BDCP
5 Revisions, in this RDEIR/SDEIS); is included to provide for site-specific evaluation for each
6 restoration project. On a project-specific basis, where high potential for methylmercury production
7 is identified that restoration design and adaptive management cannot fully address while also
8 meeting restoration objectives, alternate restoration areas will be considered. CM-12 will/would be
9 implemented in coordination with other similar efforts to address mercury in the Delta, and
10 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
11 will/would include the following actions.

- 12 • Assess pre-restoration conditions to determine the risk that the project could result in increased
13 mercury methylation and bioavailability
- 14 • Define design elements that minimize conditions conducive to generation of methylmercury in
15 restored areas.
- 16 • Define adaptive management strategies that can be implemented to monitor and minimize
17 actual postrestoration creation and mobilization of methylmercury.

18 ~~Site-specific restoration plans that address the creation and mobilization of mercury, as well as~~
19 ~~monitoring and adaptive management as described in CM12 would be available to address the~~
20 ~~uncertainty of methylmercury levels in restored tidal marsh and potential impacts on tricolored~~
21 ~~blackbird.~~

22 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
23 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
24 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
25 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
26 2009). The effect of selenium toxicity differs widely between species and also between age and sex
27 classes within a species. In addition, the effect of selenium on a species can be confounded by
28 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
29 2009).

30 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
31 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
32 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
33 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
34 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
35 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
36 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
37 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
38 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
39 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic
40 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
41 levels of selenium have a higher risk of selenium toxicity.

42 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
43 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to

1 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh
2 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
3 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
4 BDCP restoration activities that create newly inundated areas could increase bioavailability of
5 selenium (see [BDCP Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration).
6 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality, of the Draft EIR/EIS*
7 and it was determined that, relative to Existing Conditions and the No Action Alternative, CM1
8 would not result in substantial, long-term increases in selenium concentrations in water in the Delta
9 under any alternative. However, it is difficult to determine whether the effects of potential increases
10 in selenium bioavailability associated with restoration-related conservation measures (CM4 and
11 CM5) would lead to adverse effects on tricolored blackbird.

12 Because of the uncertainty that exists at this programmatic level of review, there could be a
13 substantial effect on tricolored blackbird from increases in selenium associated with restoration
14 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
15 *Management* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)[BDCP Appendix 3-C,](#)
16 [Avoidance and Minimization Measures](#)) which would provide specific tidal habitat restoration design
17 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
18 habitats. Furthermore, the effectiveness of selenium management to reduce selenium
19 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
20 part of design and implementation. This avoidance and minimization measure would be
21 implemented as part of the tidal habitat restoration design schedule.

22 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and
23 sedimentation, and operations and maintenance of the water conveyance facilities would not be
24 adverse with the implementation of AMM1-AMM7 and *AMM21 Tricolored Blackbird*.

25 Tidal habitat restoration could result in increased exposure of [California least tern tricolored](#)
26 [blackbird](#) to selenium. This effect would be addressed through the implementation of *AMM27*
27 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
28 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

29 The implementation of tidal natural communities restoration or floodplain restoration could result
30 in increased exposure of tricolored blackbird to methylmercury. It is unlikely that breeding
31 tricolored blackbird would be highly susceptible to methylmercury exposure because tidal wetlands
32 are not expected to be a major foraging area for the species. However, it is unknown what
33 concentrations of methylmercury are harmful to this species and the potential for increased
34 exposure varies substantially within the study area. [Implementation of CM12 which contains](#)
35 [measures to assess the amount of mercury before project development, followed by appropriate](#)
36 [design and adaptation management, would minimize the potential for increased methylmercury](#)
37 [exposure, and would result in no adverse effect on tricolored blackbird.](#) ~~Site-specific restoration~~
38 ~~plans that address the creation and mobilization of mercury, as well as monitoring and adaptive~~
39 ~~management as described in *CM12 Methylmercury Management*, would better inform the potential~~
40 ~~effects of methylmercury on tricolored blackbird. The site-specific planning phase of marsh~~
41 ~~restoration would be the appropriate place to assess the potential for risk of methylmercury~~
42 ~~exposure for tricolored blackbird, once site-specific sampling and other information could be~~
43 ~~developed.~~

1 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
2 sedimentation, and operations and maintenance of the water conveyance facilities would be less
3 than significant with the implementation of *AMM21 Tricolored Blackbird* and *AMM1-AMM7*.

4 Tidal habitat restoration could result in increased exposure of ~~California least tern~~*tricolored*
5 *blackbird* to selenium. This impact would be addressed through the implementation of *AMM27*
6 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
7 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

8 The implementation of tidal natural communities restoration or floodplain restoration could result
9 in increased exposure of tricolored blackbird to methylmercury. It is unlikely that breeding
10 tricolored blackbird would be highly susceptible to methylmercury exposure because tidal wetlands
11 are not expected to be a major foraging area for the species. However, it is unknown what
12 concentrations of methylmercury are harmful to this species. Implementation of CM12 which
13 contains measures to assess the amount of mercury before project development, followed by
14 appropriate design and adaptation management, would minimize the potential for increased
15 methylmercury exposure, and would result in no adverse effect on tricolored blackbird.~~Site-specific~~
16 ~~restoration plans that address the creation and mobilization of mercury, as well as monitoring and~~
17 ~~adaptive management as described in CM12 Methylmercury Management, would better inform the~~
18 ~~potential impacts of methylmercury on tricolored blackbird. With these measures in place, indirect~~
19 ~~effects from Alternative 4 would have a less-than-significant impact on tricolored blackbird.~~

20 Therefore, with AMM1-7, AMM21, AMM27, and CM12 in place, the indirect effects of Alternative 4
21 implementation would not result in a substantial adverse effect through habitat modification or
22 potential mortality. Therefore, the indirect effects of Alternative 4 implementation would have a
23 less-than-significant 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 12-4-37). 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; see Table 12-4-37) 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 4, including water conveyance facilities construction
8 and implementation of other conservation components, on western burrowing owl. Western
9 burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and foraging.
10 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 4 conservation measures would result in
15 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in
16 Table 12-4-39. Full implementation of Alternative 4 would also include the following conservation
17 actions over the term of the BDCP to benefit the western burrowing owl ([BDCP-see Chapter 3,](#)
18 [Section 3.3, Biological Goals and Objectives, of the Draft BDCP](#)).

- 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.

1
2

Table 12-4-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	High-value	920	920	220	220	NA	NA
	Low-value	2,403	2,403	747	747	NA	NA
Total Impacts CM1		3,323	3,323	967	967		
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
Total Impacts CM2-CM18		8,014	40,076	389	1,299	2,912-6,230	6,941
Total High-value		5,407	12,490	465	548	1,390-3,303	779
Total Low-value		5,930	30,909	891	1,718	1,522-2,927	6,162
TOTAL IMPACTS		11,337	43,399	1,356	2,266	2,912-6,230	6,941

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3
4

Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing Owl

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to ~~46,309~~45,665 acres of modeled habitat for western burrowing owl (of which 13, ~~130~~038 acres is of high-value and ~~33,179~~32,627 acres is of low value, Table 12-4-39). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of ~~reusable tunnel material~~borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*. The majority of habitat loss (29,668 acres) would result from 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 western burrowing owl 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.

20

1 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
2 facilities would result in the combined permanent and temporary loss of up to 4,9341,140 acres
3 of acres of modeled high-value western burrowing owl habitat (881-920 acres of permanent
4 loss, 354-220 acres of temporary loss) from CZs 3–6 and CZ 8. In addition, 3,7023,150 acres of
5 low-value burrowing owl habitat would be removed (3,0132,403 acres of permanent loss, 689
6 747 acres of temporary loss). The majority of high-value grassland habitat that would be
7 removed would be in CZ 8, from the construction of the new forebay in CZ 8. There is a high
8 concentration of CNDDDB and DHCCP survey records for western burrowing owls in CZ 8 to the
9 west and the south of the Clifton Court Forebay. The loss of high-value habitat from facility
10 construction and the establishment of the forebay RTM storage area could remove occupied
11 habitat, displace nesting and wintering owls, and fragment occupied burrowing owl habitat.

12 The RTM storage area overlaps with six occurrences of western burrowing owl and there are
13 also several occurrences west of the new forebay control structure that could be indirectly
14 affected by construction activities. The amount of storage area needed for reusable tunnel
15 material is flexible (dependent on storage pile height and other factors) and the footprint used
16 in the effects analysis is based on a worst case scenario. However, the actual area to be affected
17 by reusable tunnel material storage would likely be less than the estimated acreage. The
18 implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*
19 *Material* and *AMM23 Western Burrowing Owl* would require that to the extent practicable, the
20 reusable tunnel material storage area footprint avoided locations where active burrows are
21 present. The footprints of a permanent transmission line and a permanent access road, both
22 located west of the Clifton Court Forebay overlap with an additional 8 occurrences of western
23 burrowing owl. Preconstruction surveys would be conducted prior to any construction activities
24 under *AMM23 Western Burrowing Owl* during the nonbreeding and the breeding season. If
25 avoidance was not possible, passive relocation would be considered in consultation with CDFW.
26 If owls were to be excluded from existing burrows, artificial burrows would be used if it were
27 possible for them to be installed within 100 meters from the existing burrows on protected
28 lands. A substantial portion of the high-value grassland protection and enhancement under *CM8*
29 *Grassland Natural Community Restoration* would be expected to occur to the west and to the
30 south of these occurrences in CZ 8, which would provide high-value protected lands in close
31 proximity to the disturbed habitat.

32 Refer to the Terrestrial Biology Map Book in Appendix A of this RDEIR/SDEIS for a detailed
33 view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-
34 14 years of Alternative 4 implementation.

35 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
36 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value
37 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in
38 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres
39 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10
40 years of Alternative 4 implementation.

41 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
42 inundation would permanently remove an estimated 29,668 acres of modeled western
43 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted
44 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value
45 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact
46 and fragment remaining high-value grassland habitat just north of Rio Vista in and around

1 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal
2 natural community restoration efforts would impact one extant record of burrowing owl just
3 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.

- 4 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
5 seasonally inundated floodplain would permanently and temporarily remove approximately
6 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of
7 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be
8 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San
9 Joaquin, Old, and Middle Rivers in CZ 7.
- 10 ● *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located
11 along levees where western burrowing owl could be present. The species is known to use often
12 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*
13 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities
14 to disturb owls or affect active nests.
- 15 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
16 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In
17 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and
18 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.
- 19 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be
20 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362
21 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The
22 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily
23 remove available habitat but would ultimately have a beneficial effect on the western burrowing
24 owl.
- 25 ● *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of
26 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.
- 27 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
28 actions that are designed to enhance wildlife values in restored or protected habitats could
29 result in localized ground disturbances that could temporarily remove small amounts of
30 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more
31 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,
32 such as removal of nonnative vegetation and road and other infrastructure maintenance
33 activities, would be expected to have minor adverse effects on available western burrowing owl
34 habitat and would be expected to result in overall improvements to and maintenance of habitat
35 values over the term of the BDCP. CM11 would also include the construction of recreational-
36 related facilities including trails, interpretive signs, and picnic tables ([BDCP-see Chapter 4,](#)
37 [Covered Activities and Associated Federal Actions, of the Draft BDCP](#)). The construction of
38 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
39 disturbed areas when and where possible. However, approximately 50 acres of grassland
40 habitat would be lost from the construction of trails and facilities.

41 Habitat management- and enhancement-related activities and equipment operation could
42 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,
43 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest
44 failure and mortality or other adverse effects on western burrowing owl would be avoided or

1 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would
2 require surveys to determine presence or absence and the establishment of no-disturbance
3 buffers around active sites.

- 4 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
5 value western burrowing owl habitat for the development of a delta and longfin smelt
6 conservation hatchery in CZ 1.
- 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 western burrowing owl 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 AMMs and conservation actions as described below.
- 13 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
14 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction
15 activities, equipment operation could destroy nests and noise and visual disturbances could lead
16 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys
17 detected any occupied burrows and no-disturbance buffers would be implemented.

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. Alternative 4 would remove ~~5,964-872~~
26 acres (~~5,368-407~~ acres permanent, ~~596-465~~ acres temporary) of high-value habitat for western
27 burrowing owl in the study area in the near-term. These effects would result from the construction
28 of the water conveyance facilities (CM1, ~~1,232-140~~ acres), and implementing other conservation
29 measures (~~CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7~~
30 ~~Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal~~
31 ~~Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and~~
32 ~~Management and CM18 Conservation Hatcheries—4,732 acres). In addition, ~~7,3736,821~~ acres of low-
33 value habitat would be removed or converted in the near-term (CM1, ~~3,702-150~~ acres; ~~CM2 Yolo~~
34 ~~Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural~~
35 ~~Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali~~
36 ~~Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management~~
37 ~~and CM18 Conservation Hatcheries—3,671 acres).~~~~

38 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
39 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. ~~A proportion of the~~
40 ~~loss of low-value habitat would result from conversion and enhancement to high-value habitats.~~
41 Using these typical ratios would indicate that ~~2,464-280~~ acres should be protected to compensate
42 for the loss of high-value habitat ~~from CM1 and that and~~ ~~3,702-150~~ acres should be protected to
43 compensate for the loss of low-value habitat from CM1. The near-term effects of other conservation
44 actions would require 9,464 acres of protection to compensate for the loss of high-value habitat and

1 3,671 acres of protection to compensate for the loss of low-value habitat using the same typical
2 NEPA and CEQA ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of
3 low-value habitat).

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 ([see Table](#)
7 [3-4 in Chapter 3, Description of Alternatives, of this RDEIR/SDEIS](#)). These conservation actions are
8 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
9 early restoration losses.

10 The protection of high-value grasslands is essential in order to sustain existing western burrowing
11 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
12 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be
13 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
14 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
15 pool natural communities which would provide habitat for western burrowing owl and reduce the
16 effects of current levels of habitat fragmentation. This protection would not only expand the amount
17 of protected high-value habitat in the study area, but also support existing western burrowing owl
18 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
19 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
20 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
21 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
22 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
23 *Communities Enhancement and Management*, small mammal and insect prey populations would be
24 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
25 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
26 natural communities by encouraging ground squirrel occupancy and expansion through the creation
27 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
28 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
29 standards for considering the effectiveness of conservation actions.

30 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
31 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
32 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
33 CM1 and other near-term effects on western burrowing owl high-value habitat with the
34 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term
35 timeframe would be managed in suitable crop types to compensate for the loss of high-value
36 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate For the Near-Term*
37 *Loss of High-Value Burrowing Owl Habitat*, would be available to address the adverse effect of high-
38 value habitat loss in the near-term.

39 The compensation for the loss of low-value burrowing owl habitat from ~~the other~~ near-term impacts
40 would be ~~241 acres less than sufficient to meet~~ the typical ratio of 1:1 protection. ~~However, 833~~
41 ~~acres of all near-term impacts on low-value habitat would be temporary and would be restored~~
42 ~~within 1 year of the completion of construction. In addition, a~~ proportion of the loss of low-value
43 habitat would be a result of the conversion to high-value habitat ~~and the near-term conservation~~
44 ~~acres would be sufficient to compensate for the permanent impacts on low-value habitat for the~~
45 ~~species. In addition, 1,356 acres of impacts on burrowing owl habitat would be temporary and~~

1 would be restored within 1 year of the completion of construction. The management and
 2 enhancement of cultivated lands and protected grasslands including prey enhancement, increasing
 3 burrow availability, and reducing existing fragmentation of high-value habitat, would further
 4 compensate for any potential effect from the near-term loss of ~~low-value~~ foraging habitat on
 5 western-burrowing owl.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 13 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 14 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

15 ***Late Long-Term Timeframe***

16 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
 17 254,352 acres of low-value habitat for western burrowing owl. Alternative 4 as a whole would result
 18 in the permanent loss of and temporary effects on 13, ~~130,038~~ acres of high-value habitat and
 19 ~~33,179~~ 32,627 acres of low-value western burrowing owl habitat over the term of the Plan. The
 20 locations of these losses are described above in the analyses of individual conservation measures.

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 22 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
 23 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
 24 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
 25 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
 26 species (see Table 3-4 in Chapter 3, [Description of Alternatives, of this RDEIR/SDEIS](#)). Grassland
 27 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2)
 28 Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal
 29 wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
 30 grassland, alkali seasonal wetland, and vernal pool natural communities which would provide
 31 habitat for western burrowing owl and reduce the effects of current levels of habitat fragmentation.
 32 This protection would not only expand the amount of protected high-value habitat in the study area,
 33 but also support existing western burrowing owl populations that occur to the west of CZ 8 and in
 34 the areas surrounding CZs 1 and 11, which would especially benefit declining populations in the
 35 vicinity of Suisun Marsh and San Pablo Bay. Certain types of cultivated lands such as irrigated
 36 pasture, alfalfa and other hay crops, and some row crops can provide foraging habitat for western
 37 burrowing owl. Under appropriate management regimes, cultivated lands can support breeding and
 38 wintering burrowing owls. To ensure that cultivated lands conservation benefits western burrowing
 39 owl, the Plan's biological goals and objectives further specify that, of the cultivated lands protected
 40 in the late long-term, at least 1,000 acres would be protected in CZs 1 and 11 that support high-value
 41 burrowing owl habitat and are within 0.5 miles of high-value grassland habitat or occupied low-
 42 value habitat (Objective WBO1.1). Under *CM11 Natural Communities Enhancement and Management*,
 43 small mammal and insect prey populations would be increased on protected lands, enhancing the
 44 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In
 45 addition, burrow availability would be increased on protected natural communities by encouraging

1 ground squirrel occupancy and expansion through the creation of berms, mounds, edges, and
2 through the prohibition of ground squirrel control programs (i.e., poisoning, Objectives ASWNC2.3,
3 VPNC2.4, GNC2.3).

4 The BDCP's beneficial effects analysis (~~BDCP~~ see Chapter 5, Section 5.6, *Effects on Covered Wildlife*
5 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
6 above could result in the protection of an estimated 33,766 acres of western burrowing owl habitat
7 (8,589 acres high-value and 25,177 acres low-value habitat) and restoration of 1,645 acres of
8 western burrowing owl habitat (1,642 acres high-value and 3 acres low-value 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
16 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
17 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

18 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-
19 status species under Alternative 4 would represent an adverse effect in the absence of other
20 conservation actions. However, with habitat protection and restoration associated with CM3, CM8,
21 and CM11, guided by biological goals and objectives and by AMM1–AMM7, *AMM23 Western*
22 *Burrowing Owl*, and with Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*
23 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and
24 management of cultivated lands, the effects of habitat loss and potential mortality on western
25 burrowing owl under Alternative 4 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. Alternative 4 would remove 5,964
32 872 acres (5,368,407 acres permanent, 596,465 acres temporary) of high-value habitat for western
33 burrowing owl in the study area in the near-term. These effects would result from the construction
34 of the water conveyance facilities (CM1, 1,232,140 acres), and implementing other conservation
35 measures (CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7
36 *Riparian Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal*
37 *Pool and Alkali Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and*
38 *Management* and CM18 *Conservation Hatcheries*—4,732 acres). In addition, 7,373,682 acres of low-
39 value habitat would be removed or converted in the near-term (CM1, 3,702,150 acres; CM2 *Yolo*
40 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural*
41 *Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali*
42 *Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management*
43 and CM18 *Conservation Hatcheries*—3,671 acres).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
2 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the
3 loss of low-value habitat would result from conversion and enhancement to high-value habitats.
4 Using these typical ratios would indicate that 2,464 acres should be protected to compensate for the
5 loss of high-value habitat from CM1 and that 3,702 acres should be protected to compensate for the
6 loss of low-value habitat from CM1. The near-term effects of other conservation actions would
7 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of
8 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA
9 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value
10 habitat).

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 ([see Table](#)
14 [3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*](#)). These conservation actions are
15 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
16 early restoration losses.

17 The protection of high-value grasslands is essential in order to sustain existing western burrowing
18 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
19 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
20 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
21 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
22 pool natural communities which would provide habitat for western burrowing owl and reduce the
23 effects of current levels of habitat fragmentation. This protection would not only expand the amount
24 of protected high-value habitat in the study area, but also support existing western burrowing owl
25 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
26 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
27 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
28 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
29 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
30 *Communities Enhancement and Management*, small mammal and insect prey populations would be
31 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
32 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
33 natural communities by encouraging ground squirrel occupancy and expansion through the creation
34 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
35 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

36 These Plan objectives represent performance standards for considering the effectiveness of
37 conservation actions.

38 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
39 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
40 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
41 CM1 and other near-term effects on western burrowing owl high-value habitat with the
42 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term
43 timeframe would be managed in suitable crop types to compensate for the loss of high-value
44 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate For the Near-Term*

1 *Loss of High-Value Burrowing Owl Habitat*, would address the impact of high-value habitat loss in the
2 near-term.

3 The compensation for the loss of low-value burrowing owl habitat from ~~the other~~ near-term impacts
4 ~~would be 241 acres less than sufficient to meet~~ the typical ratio of 1:1 protection. ~~However, 833~~
5 ~~acres of all near-term impacts on low-value habitat would be temporary and would be restored~~
6 ~~within 1 year of the completion of construction. In addition, a~~ proportion of the loss of low-value
7 habitat would be a result of the conversion to high-value habitat ~~and the near-term conservation~~
8 ~~acres would be sufficient to compensate for the permanent impacts on low-value habitat for the~~
9 ~~species. In addition, 1,356 acres of impacts on burrowing owl habitat would be temporary and~~
10 ~~would be restored within 1 year of the completion of construction.~~ The management and
11 enhancement of cultivated lands and protected grasslands including prey enhancement, increasing
12 burrow availability, and reducing existing fragmentation of high-value habitat, would further
13 compensate for any potential effect from the near-term loss of ~~low-value~~ foraging habitat on
14 western-burrowing owl.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
22 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
23 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

24 [The loss of western burrowing owl habitat and potential for mortality of this special-status species](#)
25 [under Alternative 4 would represent an adverse effect in the absence of other conservation actions.](#)
26 [However, with habitat protection and restoration associated with CM3, CM8, and CM11, guided by](#)
27 [biological goals and objectives and by AMM1–AMM7, AMM23 Western Burrowing Owl, and with](#)
28 [Mitigation Measure BIO-91, Compensate for Near-Term Loss of High-Value Western Burrowing Owl](#)
29 [Habitat, which would be available to guide the near-term protection and management of cultivated](#)
30 [lands, the effects of habitat loss and potential mortality on western burrowing owl under Alternative](#)
31 [4 would be less-than-significant.](#)

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 4 as a whole would result
35 in the permanent loss of and temporary effects on 13, ~~130-038~~ acres of high-value habitat and
36 ~~33,179~~ 32,627 acres of low-value western burrowing owl habitat over the term of the Plan. The
37 locations of these losses are 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 ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). Grassland
44 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and

1 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
 2 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 3 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 4 provide habitat for western burrowing owl and reduce the effects of current levels of habitat
 5 fragmentation. This protection would not only expand the amount of protected high-value habitat in
 6 the study area, but also support existing western burrowing owl populations that occur to the west
 7 of CZ 8 and in the areas surrounding CZs 1 and 11, which would especially benefit declining
 8 populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain types of cultivated lands such
 9 as irrigated pasture, alfalfa and other hay crops, and some row crops can provide foraging habitat
 10 for western burrowing owl. Under appropriate management regimes, cultivated lands can support
 11 breeding and wintering burrowing owls. To ensure that cultivated lands conservation benefits
 12 western burrowing owl, the Plan's biological goals and objectives further specify that, of the
 13 cultivated lands protected in the late long-term, at least 1,000 acres would be protected in CZs 1 and
 14 11 that support high-value burrowing owl habitat and are within 0.5 miles of high-value grassland
 15 habitat or occupied low-value habitat (Objective WBO1.1). Under *CM11 Natural Communities*
 16 *Enhancement and Management*, small mammal and insect prey populations would be increased on
 17 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 18 VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected natural
 19 communities by encouraging ground squirrel occupancy and expansion through the creation of
 20 berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
 21 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

22 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
 23 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
 24 above could result in the protection of an estimated 33,766 acres of western burrowing owl habitat
 25 (8,589 acres high-value and 25,177 acres low-value habitat) and restoration of 1,645 acres of
 26 western burrowing owl habitat (1,642 acres high-value and 3 acres low-value habitat).

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 34 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 35 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

36 Considering Alternative 4's protection and restoration provisions, which would provide acreages of
 37 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
 38 construction and restoration activities, and with implementation of *AMM1-AMM7*, *AMM23 Western*
 39 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*
 40 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and
 41 management of cultivated lands, the loss of habitat or direct mortality through implementation of
 42 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
 43 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
 44 habitat or potential mortality under this alternative would have a less-than-significant impact on
 45 western burrowing owl.

1 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western**
2 **Burrowing Owl Habitat**

3 Because the BDCP lacks an acreage commitment for specific crop types that would be protected
4 and managed within the 15,400 acres of cultivated lands protected in the near-term time period,
5 DWR will compensate for the loss of high-value burrowing owl habitat with high-value natural
6 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

7 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission**
8 **Facilities**

9 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
10 which could result in injury or mortality of western burrowing owl. The species is large-bodied but
11 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls
12 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,
13 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk
14 species for powerline collision. While the species is not widespread in the study area, it may become
15 more widely distributed as grassland enhancement improves habitat for the species. Even so, the
16 risk of effects on the population are low, given its physical and behavioral characteristics (BDCP
17 Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission*
18 *Lines*). and new transmission lines would not be expected to have an adverse effect on the species.
19 Marking transmission lines with flight diverters that make the lines more visible to birds has been
20 shown to dramatically reduce the incidence of bird mortality (Brown and Drewien 1995). Yee
21 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
22 All new project transmission lines would be fitted with flight diverters. Bird flight diverters would
23 make transmission lines highly visible to western burrowing owls and would further reduce any
24 potential for powerline collisions.

25 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
26 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal
27 based on the owl's physical and behavioral characteristics. All new transmission lines constructed as
28 a result of the project would be fitted with bird diverters (AMM20 Greater Sandhill Crane), which
29 have been shown to reduce avian mortality by 60%, which would further reduce any potential for
30 powerline collisions.

31 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
32 significant impact on western burrowing owl because the risk of bird strike is considered to be
33 minimal based on the owl's physical and behavioral characteristics. All new transmission lines
34 constructed as a result of the project would be fitted with bird diverters (AMM20 Greater Sandhill
35 Crane), which have been shown to reduce avian mortality by 60%, which would further reduce any
36 potential for powerline collisions.

37 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

38 Noise and visual disturbances associated with construction-related activities could result in
39 temporary disturbances that affect western burrowing owl use of up to 13,922 acres of modeled
40 burrowing owl habitat (6,113 acres of high-value habitat) within 500 feet of covered activities will
41 temporarily be made less suitable as a result of construction noise and visual disturbances adjacent
42 to proposed construction areas. Indirect effects associated with construction include noise, dust, and
43 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.

1 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season
2 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January
3 31) could potential displace winter owls or cause abandonment of active nests. These potential
4 effects would be minimized with incorporation of *AMM23 Western Burrowing Owl* into the BDCP,
5 which would require preconstruction surveys and establish no-disturbance buffers around active
6 burrows. Construction noise above background noise levels (greater than 50 dBA) could extend 500
7 to 5,250 feet from the edge of construction activities (~~Draft BDCP~~ Appendix 5.J, Attachment 5J.D,
8 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4 [in](#)
9 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS](#)), although there are no available data to
10 determine the extent to which these noise levels could affect western burrowing owl.

11 The use of mechanical equipment during water conveyance facilities construction could cause the
12 accidental release of petroleum or other contaminants that could affect western burrowing owl in
13 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
14 western burrowing owl habitat could also affect the species. AMM1–AMM7 in addition to *AMM23*
15 *Western Burrowing Owl* would minimize the likelihood of such spills and ensure that measures were
16 in place to prevent runoff from the construction area and any adverse effects of dust on active nests.

17 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 4 implementation
18 could have adverse effects on this species through the modification of habitat and potential for
19 direct mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting
20 owls or active burrows in the high-value grassland habitat surrounding Clifton Court Forebay and
21 adjacent to work area. With the implementation of AMM1–AMM7, and *AMM23 Western Burrowing*
22 *Owl*, the indirect effects from Alternative 4 implementation would not be adverse under NEPA.

23 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 4
24 implementation could have significant impacts on these species through the modification of habitat
25 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential
26 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton
27 Court Forebay and adjacent to work areas. With the implementation of AMM1–AMM7 and *AMM23*
28 *Western Burrowing Owl*, the indirect effects resulting from Alternative 4 implementation would have
29 a less-than-significant impact on western burrowing owl.

30 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result** 31 **of Implementation of Conservation Components**

32 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
33 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,390–
34 3,303 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-4-39).

35 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
36 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled
37 habitat (6,162 acres, of which would be low-value foraging habitat; Table 12-4-39).

38 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation
39 frequency and duration of cultivated lands and grassland habitats may affect prey populations that
40 have insufficient time to recover following inundation events. Depending on timing, seasonal
41 inundation of western burrowing owl habitat could result in displacement from nesting burrows or
42 drowning of individuals. The potential for this effect is considered low because suitable burrow sites
43 would most likely be located along setback levees, which are expected to be subject to inundation

1 less frequently than floodplain surfaces that would be less likely to support suitable nesting
2 burrows.

3 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on
4 the population. The potential for direct mortality of western burrowing owl caused by inundation
5 would be low because the locations of burrows would likely be above elevations consistently subject
6 to inundation; therefore, the potential impact would not be adverse.

7 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation
8 would be low because the locations of burrows would likely be above elevations consistently subject
9 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant
10 impact on the population.

11 **Western Yellow-Billed Cuckoo**

12 This section describes the effects of Alternative 4, including water conveyance facilities construction
13 and implementation of other conservation components, on western yellow-billed cuckoo. The
14 habitat model for Western yellow-billed cuckoo includes potential breeding habitat, which includes
15 plant alliances from the valley/foothill riparian modeled habitat that contain a dense forest canopy
16 for foraging with understory willow for nesting, and a minimum patch size of 50 acres, and
17 migratory habitat, which includes the same plant alliances as breeding habitat without the minimum
18 50 acres patch size requirement.

19 The western yellow-billed cuckoo is uncommon in the study area at present, and the likelihood that
20 it would be found using the modeled habitat is low relative to more abundant riparian species.
21 Nesting of the species in the study area has not been confirmed for approximately 100 years.
22 Western yellow-billed cuckoo was detected in the study area during 2009 DHCCP surveys, but
23 nesting was not confirmed and the bird is suspected to have been a migrant ([see Appendix 12C,
24 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report, of the Draft EIR/EIS](#)).
25 Construction and restoration associated with Alternative 4 conservation measures would result in
26 both temporary and permanent losses of Western yellow-billed cuckoo modeled habitat as indicated
27 in Table 12-4-40. Full implementation Alternative 4 would also include the following conservation
28 actions over the term of the BDCP to benefit the western yellow-billed cuckoo ([BDCP-see Chapter 3,
29 Section 3.3, Biological Goals and Objectives, of the Draft BDCP](#)).

- 30 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
31 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
32 associated with CM7).
- 33 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
34 10 (Objective VFRNC1.2, associated with CM3).
- 35 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
36 associated with CM3 and CM7).
- 37 ● Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
38 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
39 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
40 associated with CM3 and CM7).

41 As explained below, with the restoration or protection of these amounts of habitat, in addition to
42 management activities that would enhance these natural communities for the species and

1 implementation of AMM1–AMM7, AMM10 Restoration of Temporarily Affected Natural Communities,
 2 and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western Yellow-Billed
 3 Cuckoo, impacts on Western yellow-billed cuckoo would not be adverse for NEPA purposes and
 4 would be less than significant for CEQA purposes.

5 **Table 12-4-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**
 6 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Breeding	6	6	4	4	NA	NA
	Migratory	18	18	19	19	NA	NA
Total Impacts CM1		24	24	23	23		
CM2–CM18	Breeding	29	142	5	10	11-20	17
	Migratory	278	383	83	94	37-64	125
Total Impacts CM2–CM18		307	525	88	104	48-84	142
Total Breeding		35	148	9	14		
Total Migratory		296	401	102	113		
TOTAL IMPACTS		331	549	111	127	48-84	142

^a See Appendix 12E, Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS, for a 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

7

8 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**
 9 **Billed Cuckoo**

10 Alternative 4 conservation measures would result in the combined permanent and temporary loss
 11 of up to ~~671~~676 acres of modeled habitat for western yellow-billed cuckoo (162 acres of breeding
 12 habitat, ~~514~~20 acres of migratory habitat, Table 12-4-40). Conservation measures that would result
 13 in these losses are conveyance facilities and transmission line construction, and establishment and
 14 use of reusable tunnel material borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass
 15 improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat
 16 enhancement and management activities (CM11) which include ground disturbance or removal of
 17 nonnative vegetation, 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 western yellow-billed cuckoo modeled habitat. Each of these

1 individual activities is described below. A summary statement of the combined impacts and NEPA
2 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 3 ● CM1 Water Facilities Construction and Operation: Construction of Alternative 4 conveyance
4 facilities would result in the combined permanent and temporary loss of up to 10 acres of
5 breeding habitat (9-6 acres of permanent loss, 1-4 acres of temporary loss) for yellow-billed
6 cuckoo. In addition, 32-37 acres of migratory habitat would be removed (14-18 acres of
7 permanent loss, 18-19 acres of temporary loss, see Table 12-4-40). Activities that would impact
8 modeled habitat consist of tunnel, forebay, and intake construction, permanent and temporary
9 access roads, and construction of transmission lines, and temporary barge unloading facilities
10 and work areas. Impacts from CM1 would occur in the central delta in CZs 3- 6, and 8.
11 Permanent habitat loss would occur from the construction of Intakes 2, 3, and 5 on the east bank
12 of the Sacramento River between Freeport and Courtland. Some habitat would also be impacted
13 by the construction of a permanent access road from the new forebay west to a reusable tunnel
14 material disposal area and where the realigned Highway 160 would cross Snodgrass Slough.
15 Additional losses would also occur along Lambert Road where permanent utility lines would be
16 installed and from the construction of an operable barrier at the confluence of Old River and the
17 San Joaquin River. Temporary losses of habitat would occur from the construction of a barge
18 unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary
19 work areas surround intake sites. Permanent and temporary habitat losses from the above CMs,
20 would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide
21 high-value habitat for the species. Temporarily affected areas would be restored as riparian
22 habitat within 1 year following completion of construction activities as described in AMM10
23 Restoration of Temporarily Affected Natural Communities. Although the effects are considered
24 temporary, the restored riparian habitat would require 5 years to several decades, for ecological
25 succession to occur and for restored riparian habitat to functionally replace habitat that has
26 been affected. The majority of the riparian vegetation to be temporarily removed is early- to
27 mid-successional; therefore, the replaced riparian vegetation would be expected to have
28 structural components comparable to the temporarily removed vegetation within the first 5 to
29 10 years after the initial restoration activities are complete.

- 30 ●
31 There are no extant occurrences of yellow-billed cuckoo nests in the study area. However,
32 habitat loss from the construction of CM1 facilities would have the potential to displace
33 individuals, if present, and remove the functions and value of modeled habitat for nesting,
34 protection, or foraging. AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,
35 Western Yellow-Billed Cuckoo (Appendix 3.C, Avoidance and Minimization Measures, of the Draft
36 BDCPBDCP Appendix 3.C, Avoidance and Minimization Measures) would minimize the effects of
37 construction on nesting cuckoos if present in the area. Refer to the Terrestrial Biology Map
38 Book in Appendix A of this RDEIR/SDEIS for a detailed view of Alternative 4 construction
39 locations. Impacts from CM1 would occur within the first 10-14 years of Alternative 4
40 implementation.

- 41 ● CM2 Yolo Bypass Fisheries Enhancement: Construction of the Yolo bypass fisheries enhancement
42 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent
43 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent
44 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss
45 is expected to occur during the first 10 years of Alternative 4 implementation. There are no
46 extant occurrences of yellow-billed cuckoo nesting in the study area.

- 1 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
2 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo
3 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no
4 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed
5 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay*
6 *Delta Conservation Plan EIR/EIS Environmental Data Report, of the Draft EIR/EIS*) in CZ 5
7 between Twin Cities Road and Walnut Grove. These detections do not overlap with the
8 hypothetical restoration areas for CM4.
- 9 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
10 seasonally inundated floodplain would permanently and temporarily remove approximately 11
11 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres
12 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of
13 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately
14 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally
15 inundated floodplain restoration actions. The actual number of acres that would be restored
16 may differ from these estimates, depending on how closely the outcome of seasonally inundated
17 floodplain restoration approximates the assumed outcome. Once this restored riparian
18 vegetation has developed habitat functions, a portion of it would be suitable to support western
19 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for
20 the cuckoo.
- 21 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
22 activities that could be implemented in protected western yellow-billed cuckoo habitats would
23 maintain and improve the functions of the habitat over the term of the BDCP. With conditions
24 favorable for its future establishment in the study area, western yellow-billed cuckoo would be
25 expected to benefit from the increase in protected habitat. However, habitat management- and
26 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were
27 present near work sites. CM11 actions designed to enhance wildlife values in restored riparian
28 habitats may result in localized ground disturbances that could temporarily remove small
29 amounts of western yellow-billed cuckoo habitat. Ground-disturbing activities, such as removal
30 of nonnative vegetation and road and other infrastructure maintenance activities, would be
31 expected to have minor adverse effects on available western yellow-billed cuckoo habitat and
32 would be expected to result in overall improvements and maintenance of western yellow-billed
33 cuckoo habitat values over the term of the BDCP.
- 34 • ~~Permanent and temporary habitat losses from the above CMs, would primarily consist of small,~~
35 ~~fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.~~
36 ~~Temporarily affected areas would be restored as riparian habitat within 1 year following~~
37 ~~completion of construction activities. Although the effects are considered temporary, the~~
38 ~~restored riparian habitat would require 5 years to several decades, for ecological succession to~~
39 ~~occur and for restored riparian habitat to functionally replace habitat that has been affected. The~~
40 ~~majority of the riparian vegetation to be temporarily removed is early- to mid-successional;~~
41 ~~therefore, the replaced riparian vegetation would be expected to have structural components~~
42 ~~comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial~~
43 ~~restoration activities are complete.~~
- 44 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
45 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
46 disturbances that could affect western yellow-billed cuckoo 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: Western yellow-billed cuckoo nesting has not been confirmed in the
5 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in
6 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
7 *Data Report, of the Draft EIR/EIS*) and the present of suitable habitat indicates that the species is
8 potentially breeding in the study area, or may nest there in the future. Construction-related
9 activities would not be expected to result in direct mortality of adult or fledged western yellow-
10 billed cuckoo if they were present in the study area, because they would be expected to avoid
11 contact with construction and other equipment. Although there is minimal habitat in the Plan
12 Area that is of appropriate width, and suitable understory to support nesting cuckoos, if
13 western yellow-billed cuckoo were to nest in the construction area, construction-related
14 activities, including equipment operation, noise and visual disturbances could destroy nests or
15 lead to their abandonment, resulting in mortality of eggs and nestlings. These effects would be
16 avoided and minimized with the incorporation of AMM22 Suisun Song Sparrow, Yellow-Breasted
17 Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo into the BDCP.

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 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 effects of construction would not be adverse under NEPA. Alternative 4 would remove 437-442
26 acres of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects
27 would result from the construction of the water conveyance facilities (CM1, 42-47 acres of modeled
28 breeding and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
29 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*
30 *Floodplain Restoration*—395 acres of modeled nesting and migratory habitat). These habitat losses
31 would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-
32 value 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-billed cuckoo in Chapter
35 3, *Conservation Strategy*, of the Draft BDCP would be 1:1 for restoration/creation and 1:1 protection
36 of valley/foothill riparian habitat. Using these ratios would indicate that 42-47 acres of
37 valley/foothill riparian habitat should be restored/created and 42-47 acres should be protected to
38 compensate for the CM1 losses of yellow-billed cuckoo habitat. The near-term effects of other
39 conservation actions would remove 395 acres of modeled habitat, and therefore require 395 acres
40 of restoration and 395 acres of protection of valley/foothill riparian using the same typical NEPA
41 and CEQA ratios (1:1 for restoration and 1:1 for 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 (see Table 3-4 in Chapter 3, *Description*
44 *of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM7

1 and would occur in the same timeframe as the construction and early restoration losses, thereby
 2 avoiding adverse effects of habitat loss on yellow-billed cuckoo. The majority of the riparian
 3 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
 4 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in ~~BDCP~~
 5 Chapter 3, *Conservation Strategy of the Draft BDCP*). Goals and objectives in the Plan for riparian
 6 restoration also include the restoration, maintenance and enhancement of structural heterogeneity
 7 with adequate vertical and horizontal overlap among vegetation components and over adjacent
 8 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These
 9 natural community biological goals and objectives would inform the near-term protection and
 10 restoration efforts and represent performance standards for considering the effectiveness of
 11 conservation actions for the species.

12 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
 13 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
 14 restored riparian habitat would require several years (early-mid successional) and several decades
 15 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
 16 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
 17 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP
 18 actions would not be expected to have an adverse population-level effect on the species. Overall,
 19 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
 20 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
 21 area.

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 [Appendix 3.C, Avoidance and Minimization](#)
 30 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)
 31 [Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization](#)
 32 [Measures.](#)

33 **Late Long-Term Timeframe**

34 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
 35 breeding and migratory habitat for yellow-billed cuckoo. Alternative 4 as a whole would result in
 36 the permanent loss of and temporary effects on ~~671-676~~ acres of modeled habitat (5% of the
 37 modeled habitat in the study area). These losses would occur from the construction of the water
 38 conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*
 39 *Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of
 40 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

1 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
 2 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
 3 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
 4 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
 5 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
 6 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
 7 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
 8 entirety the vegetative structure needed to support these species, because patch sizes may not be
 9 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
 10 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
 11 would expand the patches of existing riparian forest in order to support the species should they
 12 become established breeders in the study area.

13 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
 14 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
 15 above could result in the restoration of 3,397 acres and the protection of 517 acres of habitat for the
 16 yellow-billed cuckoo.

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 and
 24 storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization](#)
 25 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D.](#)
 26 [Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix 3.C, Avoidance and Minimization](#)
 27 [Measures.](#)

28 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 4 would
 29 represent an adverse effect in the absence of other conservation actions. However, the species is not
 30 an established breeder in the study area and current presence is limited to migrants. In addition, the
 31 habitat that would be lost consists of small, fragmented riparian stands that do not provide high-
 32 value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and
 33 CM11, guided by biological goals and objectives and by AMM1-AMM7, [AMM10](#), and AMM22 *Suisun*
 34 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be
 35 in place ~~during all project activities throughout the construction period~~, the effects of habitat loss
 36 and potential mortality on western yellow-billed cuckoo under Alternative 4 would not be adverse.

37 **CEQA Conclusion:**

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 and/or restoration in an appropriate timeframe to ensure that the
 42 effects of construction would be less than significant under CEQA. Alternative 4 would remove ~~437~~
 43 ~~442~~ acres of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These
 44 effects would result from the construction of the water conveyance facilities (CM1, ~~42-47~~ acres of

1 modeled breeding and migratory habitat), and implementing other conservation measures (*CM2*
 2 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
 3 *Inundated Floodplain Restoration*—395 acres of modeled nesting and migratory habitat). These
 4 habitat losses would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not
 5 provide high-value habitat for the species.

6 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 7 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
 8 3, *Conservation Strategy*, of the *Draft BDCP* would be 1:1 for restoration/creation and 1:1 protection
 9 of valley/foothill riparian habitat. Using these ratios would indicate that ~~42-47~~ acres of
 10 valley/foothill riparian habitat should be restored/created and ~~42-47~~ acres should be protected to
 11 mitigate the CM1 losses of yellow-billed cuckoo habitat. The near-term effects of other conservation
 12 actions would remove 395 acres of modeled habitat, and therefore require 395 acres of restoration
 13 and 395 acres of protection of valley/foothill riparian using the same typical NEPA and CEQA ratios
 14 (1:1 for restoration and 1:1 for protection).

15 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
 16 valley/foothill riparian natural community in the study area ([see](#) Table 3-4 in Chapter 3, *Description*
 17 *of Alternatives*, [of this RDEIR/SDEIS](#)). These conservation actions are associated with CM3 and CM7
 18 and would occur in the same timeframe as the construction and early restoration losses, thereby
 19 avoiding adverse effects of habitat loss on yellow-billed cuckoo. The majority of the riparian
 20 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
 21 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in *BDCP*
 22 Chapter 3, *Conservation Strategy*, [of the Draft EIR/EIS](#)). Goals and objectives in the Plan for riparian
 23 restoration also include the restoration, maintenance and enhancement of structural heterogeneity
 24 with adequate vertical and horizontal overlap among vegetation components and over adjacent
 25 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These
 26 natural community biological goals and objectives would inform the near-term protection and
 27 restoration efforts and represent performance standards for considering the effectiveness of
 28 conservation actions for the species.

29 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
 30 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
 31 restored riparian habitat would require several years (early-mid successional) and several decades
 32 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
 33 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
 34 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP
 35 actions would not be expected to have an adverse population-level effect on the species. Overall,
 36 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
 37 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
 38 area.

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
 45 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 [Appendix 3.C, Avoidance and Minimization](#)
2 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)
3 [Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization](#)
4 [Measures.](#)

5 [In the absence of other conservation actions, the loss of western yellow-billed cuckoo habitat](#)
6 [associated with Alternative 4 would represent an adverse effect as a result of habitat modification](#)
7 [and potential for direct mortality of a special-status species. However, the species is not an](#)
8 [established breeder in the study area and current presence is limited to migrants. In addition, the](#)
9 [habitat that would be lost consists of small, fragmented riparian stands that do not provide high-](#)
10 [value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and](#)
11 [CM11, guided by biological goals and objectives and by AMM1-AMM7, AMM10, and AMM22 *Suisun*](#)
12 [Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo, which would be](#)
13 [in place during all project activities, the effects of habitat loss and potential mortality on western](#)
14 [yellow-billed cuckoo under Alternative 4 would be less-than-significant.](#)

15 **Late Long-Term Timeframe**

16 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
17 breeding and migratory habitat for yellow-billed cuckoo. Alternative 4 as a whole would result in
18 the permanent loss of and temporary effects on [671-676](#) acres of modeled habitat (5% of the
19 modeled habitat in the study area). These losses would occur from the construction of the water
20 conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural*
21 *Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The locations of
22 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). In addition, at least
29 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
30 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
31 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
32 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
33 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
34 entirety the vegetative structure needed to support these species, because patch sizes may not be
35 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
36 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
37 would expand the patches of existing riparian forest in order to support the species should they
38 become established breeders in the study area.

39 The BDCP's beneficial effects analysis ([BDCP-see](#) Chapter 5, Section 5.6, *Effects on Covered Wildlife*
40 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
41 above could result in the restoration of 3,397 acres and the protection of 517 acres of habitat for the
42 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 [Appendix 3.C, Avoidance and Minimization](#)*
7 *[Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)*
8 *[Substantive BDCP Revisions, of this RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization](#)*
9 *[Measures.](#)*

10 [In the absence of other conservation actions, effects on Western yellow-billed cuckoo from](#)
11 [Alternative 4 would represent an adverse effect as a result of habitat modification and potential for](#)
12 [direct mortality of a special-status species; however, c](#)Considering Alternative 4's protection and
13 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
14 greater than necessary to compensate for the time lag of restoring habitats lost to construction and
15 restoration activities, and with implementation of AMM1–AMM7, [AMM10](#), and AMM22 Suisun Song
16 Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo, the loss of habitat or
17 direct mortality through implementation of Alternative 4 would not result in a substantial adverse
18 effect through habitat modifications and would not substantially reduce the number or restrict the
19 range of the species. Therefore, the loss of habitat or potential mortality under this alternative
20 would have a less-than-significant impact on western yellow-billed cuckoo.

21 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 22 **Constructing the Water Conveyance Facilities**

23 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance
24 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.
25 This could temporarily reduce the extent and functions supported by the affected habitat. Because
26 western yellow-billed cuckoo is not currently [known to breed in the study area, and the protection](#)
27 [and restoration of riparian habitat will expand contiguous habitat block requirements, habitat](#)
28 [fragmentation would have a present in the study area, and because the implementation of CM5](#)
29 [Seasonally Inundated Floodplain Restoration would protect and create contiguous high-value](#)
30 [riparian habitat, any such habitat fragmentation is expected to have no or](#) minimal effect on the
31 species.

32 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed
33 cuckoo. The habitat functions in the study area for the species would be greatly improved through
34 the implementation of CM5, which would restore and protect large contiguous patches of riparian
35 habitat.

36 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western
37 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly
38 improved through the implementation of CM5, which would restore and protect large contiguous
39 patches of riparian habitat.

40 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical** 41 **Transmission Facilities**

42 New transmission lines would increase the risk for bird-power line strikes, which could result in
43 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses

1 riparian forests to meet all of its breeding and wintering life requisites, the species remains
2 primarily within the canopy of riparian forests and rarely ventures into open spaces except during
3 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer
4 resident, ~~if the species were to occur~~ in the study area, ~~it would be~~ during periods of relatively high
5 visibility and clear weather conditions, thus further reducing collision risk from daily use patterns
6 or seasonal migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by
7 low wing loading and a moderate aspect ratio, making the species moderately maneuverable and
8 presumably able to avoid collisions, especially during high-visibility conditions (BDCP Attachment
9 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).

10 Transmission line poles and towers also provide perching substrate for raptors, ~~which are predators~~
11 ~~on western yellow-billed cuckoo. Although there is potential for transmission lines to result in~~
12 ~~increased perching opportunities for raptors, the existing network of transmission lines in the study~~
13 ~~area currently poses these risks and any incremental risk associated with the new power line~~
14 ~~corridors would not be expected to affect the population. In addition, the transmission lines that~~
15 ~~would be constructed in the vicinity of modeled western yellow-billed cuckoo habitat would be~~
16 ~~temporary and would be removed within 10-14 years of Alternative 4 implementation. Because~~
17 ~~there is low probability for the species to occur in the study area, and because the transmission lines~~
18 ~~that would be constructed near modeled habitat would be temporary, any increase in predation risk~~
19 ~~on western yellow-billed cuckoo from an increase in raptor perching opportunities is minimal, which~~
20 ~~could result in increased predation pressure on western yellow-billed cuckoo if they were to use~~
21 ~~habitat adjacent to lines.~~

22 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the
23 study area, its proclivity to remain in the riparian canopy, its presence in the study area during
24 periods of relative high visibility, and its overall ability to successfully negotiate around overhead
25 wires that it may encounter. Transmission line poles and towers also provide perching substrate for
26 raptors, which could result in increased predation pressure on western yellow-billed cuckoo.
27 ~~However, because there is a low probability for the species to occur in the study area, and because~~
28 ~~the transmission lines that would be constructed near modeled habitat would be temporary, any~~
29 ~~increase in predation risk on western yellow-billed cuckoo from an increase in raptor perching~~
30 ~~opportunities is minimal. Therefore the construction and operation of new transmission lines under~~
31 ~~Alternative 4 This would not be expected to have result in~~ an adverse effect on ~~the~~ western yellow-
32 billed cuckoo ~~population.~~

33 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
34 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to
35 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian
36 canopy, its presence during periods of relative high visibility, and its overall ability to successfully
37 negotiate around overhead wires that it may encounter. ~~Transmission line poles and towers also~~
38 ~~provide perching substrate for raptors, which could result in increased predation pressure on~~
39 ~~western yellow-billed cuckoo. However, because there is a low probability for the species to occur in~~
40 ~~the study area, and because the transmission lines that would be constructed near modeled habitat~~
41 ~~would be temporary, any increase in predation risk on western yellow-billed cuckoo from an~~
42 ~~increase in raptor perching opportunities is minimal. Therefore the construction and operation of~~
43 ~~new transmission lines under Alternative 4 would result in~~ ~~Transmission line poles and towers also~~
44 ~~provide perching substrate for raptors, which could result in increased predation pressure on~~
45 ~~western yellow-billed cuckoo. This would be expected to have~~ a less-than-significant impact on ~~the~~
46 western yellow-billed cuckoo ~~population.~~

1 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

2 **Construction- and operation-related effects:** Noise and visual disturbances associated with
3 construction-related activities could result in temporary disturbances that affect western yellow-
4 billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction noise
5 above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge
6 of construction activities (~~Draft BDCP~~ Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
7 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4 in Appendix D, Substantive
8 BDCP Revisions, of this RDEIR/SEIS), although there are no available data to determine the extent to
9 which these noise levels could affect western yellow-billed cuckoo. Indirect effects associated with
10 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
11 other ground-disturbing operations outside the project footprint but within 1,300 feet from the
12 construction edge. If western yellow-billed cuckoo were to nest in or adjacent to work areas,
13 construction and subsequent maintenance-related noise and visual disturbances could mask calls,
14 disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting habitat for these
15 species. These potential effects would be minimized with incorporation of AMM22 *Suisun Song*
16 *Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP. The
17 use of mechanical equipment during water conveyance facilities construction could cause the
18 accidental release of petroleum or other contaminants that could affect western yellow-billed
19 cuckoo in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent
20 to western yellow-billed cuckoo habitat could also affect the species. AMM1–AMM7, including AMM2
21 Construction Best Management Practices and Monitoring, AMM10, in addition to AMM22 *Suisun Song*
22 *Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* would minimize the
23 likelihood of such spills from occurring and ensure that measures were in place to prevent runoff
24 from the construction area and any adverse effects of dust on active nests.

25 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 4
26 implementation could have adverse effects on the species through the modification of habitat and
27 potential for direct mortality. However, due to the species' minimal presence in the study area, and
28 with the incorporation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*,
29 *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP, indirect effects would not have an
30 adverse effect on western yellow-billed cuckoo.

31 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 4
32 implementation could have a significant impact on the species from modification of habitat. With the
33 incorporation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's*
34 *Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP, indirect effects as a result of Alternative 4
35 implementation would have a less-than-significant impact on western yellow-billed cuckoo.

36 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a**
37 **Result of Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
39 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo
40 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased
41 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the
42 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian
43 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and
44 changes to frequency and inundation would be within the tolerance of these vegetation types.

1 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
2 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding
3 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect
4 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside
5 the period the floodplains would likely be inundated, and periodic inundation of floodplains is
6 expected to restore a more natural flood regime in support of riparian vegetation types that provide
7 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal
8 inundation in existing riparian natural communities is likely to be beneficial for western yellow-
9 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological
10 processes in riparian areas, and flooding promotes the germination and establishment of many
11 native riparian plants.

12 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if
13 they were to establish as breeders in the study area, because flooding is expected to occur outside of
14 the breeding season.

15 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
16 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is
17 expected to occur outside of the breeding season.

18 **White-Tailed Kite**

19 This section describes the effects of Alternative 4, including water conveyance facilities construction
20 and implementation of other conservation components, on white-tailed kite. The habitat model used
21 to assess impacts on white-tailed kite includes nesting habitat and foraging habitat. Most white-
22 tailed kites in the Sacramento Valley are found in oak and cottonwood riparian forests, valley oak
23 woodlands, or other groups of trees and are usually associated with compatible foraging habitat for
24 the species in patches greater than 1,500 square meters (Erichsen et al. 1996). Modeled foraging
25 habitat for white-tailed kite consists of pasture and hay crops, compatible row and grain crops and
26 natural vegetation such as seasonal wetlands and annual grasslands (Erichsen et al. 1995).

27 Construction and restoration associated with Alternative 4 conservation measures would result in
28 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-
29 4-41. The majority of the losses would take place over an extended period of time as tidal marsh is
30 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be
31 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
32 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
33 restoration of habitat function would be minimized by specific requirements of [AMM18-AMM39](#)
34 [Swainson's Hawk and White-Tailed Kite](#), including the planting of mature trees in the near-term time
35 period. Full implementation of Alternative 4 would also include the following biological objectives
36 over the term of the BDCP to benefit the white-tailed kite ([BDCP-see](#) Chapter 3, Section 3.3,
37 [Biological Goals and Objectives, of the Draft BDCP](#)).

- 38 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
39 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
40 associated with CM7).
- 41 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
42 10 (Objective VFRNC1.2, 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 • 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 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
10 VPNC2.5, and GNC2.4, associated with CM11).
- 11 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
12 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 13 • Plant and maintain native trees along roadsides and field borders within protected cultivated
14 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 15 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
16 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
17 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
18 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 19 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
20 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11)

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, *AMM10 Restoration of Temporarily Affected Natural Communities*,
24 and *AMM18-AMM39 Swainson's Hawk and White-Tailed Kite*, impacts on white-tailed kite would not
25 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Nesting	31	31	21	21	NA	NA
	Foraging	3,420	3,420	1,181	1,181	NA	NA
Total Impacts CM1		3,451	3,451	1,202	1,202		
CM2–CM18	Nesting	312	507	88	121	48–82	230
	Foraging	8,723	52,675	516	1,484	3,030–6,651	7,402
Total Impacts CM2–CM18		9,035	53,182	604	1,605	3,078–6,733	7,632
Total Nesting		343	538	109	142		
Total Foraging		12,143	56,095	1,697	2,665		
TOTAL IMPACTS		12,486	56,663	1,806	2,807	3,078–6,733	7,632

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

2

3 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

4 Alternative 4 conservation measures would result in the combined permanent and temporary loss
5 of up to ~~6059,470~~ acres of modeled habitat (~~677,680~~ acres of nesting habitat and ~~59,793,58,760~~
6 acres of foraging habitat) for white-tailed kite (Table 12-4-41). Conservation measures that would
7 result in these losses are conveyance facilities and transmission line construction, and establishment
8 and use of ~~reusable tunnel material~~~~borrow and spoil~~ areas (CM1), Yolo Bypass fisheries
9 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian
10 restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),
11 nontidal 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 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 affect white-tailed kite 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 follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 water conveyance
19 facilities would result in the combined permanent and temporary loss of up to ~~49,52~~ acres of
20 white-tailed kite nesting habitat (~~26,31~~ acres of permanent loss and ~~23,21~~ acres of temporary

1 loss). In addition, 5,6344,601 acres of foraging habitat would be removed (4,3393,420 acres of
 2 permanent loss, 1,2951,181 acres of temporary loss). Activities that would impact modeled
 3 white-tailed kite habitat consist of tunnel, forebay, and intake construction, temporary access
 4 roads, and construction of transmission lines. Most of the permanent loss of nesting habitat
 5 would occur where Intakes 1–3 impact the Sacramento River’s east bank between Freeport and
 6 Courtland. The riparian areas here are very small patches, some dominated by valley oak and
 7 others by nonnative trees. Some nesting habitat would be lost due to construction of a
 8 permanent access road from the new forebay west to a reusable tunnel material disposal area
 9 and where the realigned Highway 160 would cross Snodgrass Slough. Permanent losses would
 10 also occur along Lambert Road where permanent utility lines would be installed and from the
 11 construction of an operable barrier at the confluence of Old River and the San Joaquin River.
 12 Temporary losses of nesting habitat would occur from the construction of a barge unloading
 13 facility west of the intermediate forebay in Snodgrass Slough Temporary losses of nesting
 14 habitat would occur where pipelines cross Snodgrass Slough and other small waterways east of
 15 the Sacramento River, and where temporary work areas surround intake sites. The riparian
 16 habitat in these areas is also composed of very small patches or stringers bordering waterways,
 17 which are composed of valley oak and scrub vegetation. There are no occurrences of nesting
 18 white-tailed kite that overlap with the construction footprint of CM1. The implementation of
 19 AMM18 AMM39 Swainson’s Hawk and White-Tailed Kite (Appendix 3.C, Avoidance and
 20 Minimization Measures, of the Draft BDCPBDCP Appendix 3.C, Avoidance and Minimization
 21 Measures) would minimize the effects of construction on kites if they were to nest in the area.
 22 Impacts on foraging habitat would occur throughout the central Delta in CZs 3- 6, and CZ 8.
 23 Refer to the Terrestrial Biology Map ~~B~~book in Appendix A of this RDEIR/SDEIS for a detailed
 24 view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-
 25 14 years of Alternative 4 implementation.

- 26 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 27 would result in the combined permanent and temporary loss of up to 170 acres of nesting
 28 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 29 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516
 30 acres of temporary loss). Activities through CM2 could involve excavation and grading in
 31 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 32 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 33 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 34 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur
 35 during the first 10 years of Alternative 4 implementation.
- 36 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
 37 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting
 38 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of
 39 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
 40 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
 41 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
 42 directly impact and fragment grassland just north of Rio Vista in and around French and
 43 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
 44 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
 45 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over
 46 fairly broad areas within the tidal restoration footprints could result in the removal or
 47 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees

1 would not be actively removed but tree mortality would be expected over time as areas became
2 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the
3 local nesting population.

- 4 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
5 seasonally inundated floodplain and riparian restoration actions would remove approximately
6 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary
7 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary
8 loss). These losses would be expected after the first 10 years of Alternative 4 implementation
9 along the San Joaquin River and other major waterways in CZ 7.
- 10 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
11 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and
12 3,991 acres as part of seasonal floodplain restoration through CM7.
- 13 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
14 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-
15 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.
16 If agricultural lands supporting higher value foraging habitat than the restored grassland were
17 removed, there would be a loss of white-tailed kite foraging habitat value.
- 18 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
19 result in the permanent conversion of 1,440 acres of cultivated lands to nontidal marsh in CZ 2
20 and CZ 4. This would not result in a loss of foraging habitat as both natural communities are
21 foraging habitat for white-tailed kite. Small patches of riparian vegetation that support White-
22 tailed kite nesting habitat may develop along the margins of restored nontidal marsh restoration
23 would also provide foraging habitat for the species.
- 24 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
25 enhancement-related activities could disturb white-tailed kite nests if they were present near
26 work sites. A variety of habitat management actions that are designed to enhance wildlife values
27 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
28 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until
29 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
30 and road and other infrastructure maintenance, are expected to have minor effects on available
31 white-tailed kite habitat and are expected to result in overall improvements to and maintenance
32 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected
33 to be minimal and would be avoided and minimized by the AMMs listed below ([AMMs are](#)
34 [described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP,](#)
35 [AMM39 White-Tailed Kite and an updated version of AMM6 Disposal and Reuse of Spoils, Reusable](#)
36 [Tunnel Material and Dredged Material is described in Appendix D, Substantive BDCP Revisions, of](#)
37 [this RDEIR/SDEIS](#)). CM11 would also include the construction of recreational-related facilities
38 including trails, interpretive signs, and picnic tables ([BDCP-see Chapter 4, Covered Activities and](#)
39 [Associated Federal Actions, of the Draft BDCP](#)). The construction of trailhead facilities, signs,
40 staging areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when
41 and where possible. However, approximately 50 acres of white-tailed kite grassland foraging
42 habitat would be lost from the construction of trails and facilities.
- 43 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
44 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation
45 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

1 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation
 2 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected
 3 nesting habitat would be restored as riparian habitat within 1 year following completion of
 4 construction activities [as described in AMM10 Restoration of Temporarily Affected Natural](#)
 5 [Communities](#). The restored riparian habitat would require 1 to several decades to functionally
 6 replace habitat that has been affected and for trees to attain sufficient size and structure suitable
 7 for nesting by white-tailed kite. [AMM18-AMM39 Swainson's Hawk and White-Tailed Kite](#) contains
 8 actions described below to reduce the effect of temporal loss of nesting habitat, including the
 9 transplanting of mature trees and planting of trees near high-value foraging habitat. The
 10 functions of agricultural and grassland communities that provide foraging habitat for white-
 11 tailed kite are expected to be restored relatively quickly.

- 12 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
 13 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 14 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance
 15 activities would include vegetation management, levee and structure repair, and re-grading of
 16 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
 17 and [AMM18-AMM39 Swainson's Hawk and White-Tailed Kite](#) in addition to conservation actions
 18 as described below.
- 19 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
 20 direct mortality of adult or fledged white-tailed kite if they were present in the study area,
 21 because they would be expected to avoid contact with construction and other equipment.
 22 However, if white-tailed kite were to nest in the construction area, construction-related
 23 activities, including equipment operation, noise and visual disturbances could affect nests or
 24 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
 25 would be avoided and minimized with the incorporation of [AMM18-AMM39 Swainson's Hawk](#)
 26 [and White-Tailed Kite](#) into the BDCP.

27 The following paragraphs summarize the combined effects discussed above and describe other
 28 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are 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 effect of construction would not be adverse under NEPA. Alternative 4 would remove [449,452](#)
 35 [acres](#) ([338,343](#) acres of permanent loss, [111,109](#) acres of temporary loss) of white-tailed kite
 36 nesting habitat in the study area in the near-term. These effects would result from the construction
 37 of the water conveyance facilities (CM1, [49,52](#) acres), and implementing other conservation
 38 measures (CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and
 39 CM5 *Seasonally Inundated Floodplain Restoration*—400 acres). In addition, [14,873,13,840](#) acres
 40 [\(12,143 acres of permanent loss, 1,697 acres of temporary loss\)](#) of white-tailed kite foraging habitat
 41 would be removed or converted in the near-term (CM1, [5,6344,601](#) acres; 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*, CM9 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, CM11 *Natural*
 45 *Communities Enhancement and Management* and CM18 *Conservation Hatcheries*—9,239 acres).

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 white-tailed kite in Chapter 3.
 3 *Conservation Strategy*, of the *Draft* BDCP would be 1:1 for restoration/creation and 1:1 protection of
 4 valley/foothill riparian habitat for nesting habitat, and 1:1 protection for foraging habitat. Using
 5 these ratios would indicate that ~~49~~52 acres of nesting habitat should be restored/ created and ~~49~~
 6 52 acres should be protected to mitigate the CM1 losses of white-tailed kite nesting habitat. In
 7 addition, ~~5,6344,601~~ acres should be protected to compensate for the CM1 losses of white-tailed kite
 8 foraging habitat. The near-term effects of other conservation actions would remove 400 acres of
 9 modeled nesting habitat, and therefore require 400 acres of restoration and 400 acres of protection
 10 of nesting habitat. Similarly, the near-term effects of other conservation actions would result in the
 11 loss or conversion of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of
 12 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and
 13 1:1 for protection of nesting habitat; 1:1 for restoration and 1:1 for protection of foraging habitat).

14 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
 15 valley/foothill riparian natural community, 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 (*see* Table 3-4 in Chapter 3, *Description of*
 20 *Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3, CM4, CM7,
 21 and CM8 and would occur in the same timeframe as the construction and early restoration losses.

22 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
 23 system with extensive wide bands or large patches of valley/foothill riparian natural community
 24 (Objectives VFRNC1.1 and VFRNC1.2 in ~~BDCP~~ Chapter 3, *Conservation Strategy, of the Draft BDCP*).
 25 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
 26 habitat for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
 27 Swainson’s hawks and therefore requires wide patches of nesting habitat where its range overlaps
 28 with Swainson’s hawk. The distribution and abundance of potential white-tailed kite nest trees
 29 would be increased by planting and maintaining native trees along roadsides and field borders
 30 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
 31 small but essential nesting habitat associated with cultivated lands would also be maintained and
 32 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
 33 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, 8, and 11 would be associated with vernal pool and alkali
 36 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 37 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 38 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
 39 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
 40 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 41 Foraging opportunities would also be improved by enhancing prey populations through the
 42 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
 43 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
 44 would also be protected and maintained as part of the cultivated lands reserve system which would
 45 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
 46 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland

1 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
 2 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
 3 of tidal natural communities, including transitional uplands would provide high-value foraging
 4 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
 5 covered and other native wildlife species would be protected in the near-term time period
 6 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection
 7 and restoration efforts and represent performance standards for considering the effectiveness of
 8 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
 9 and the additional detail in the biological objectives satisfy the typical mitigation that would be
 10 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
 11 the near-term effects of the other conservation measures.

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 white-tailed kite nesting habitat. The 800 acres of restored riparian
 15 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 16 require one to several decades to functionally replace habitat that has been affected and for trees to
 17 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
 18 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
 19 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 would further reduce this limited resource and could reduce or restrict the number of active
 23 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

24 ~~AMM18-AMM39~~ *Swainson's Hawk and White-Tailed Kite* would implement a program to plant large
 25 mature trees, including transplanting trees scheduled for removal. These would be supplemented
 26 with additional saplings and would be expected to reduce the temporal effects of loss of nesting
 27 habitat. The plantings would occur prior to or concurrent with (in the case of transplanting) the loss
 28 of trees. In addition, at least five trees (5-gallon container size) would be planted within the BDCP
 29 reserve system for every tree 20 feet or taller anticipated to be removed by construction during the
 30 near-term period. A variety of native tree species would be planted to provide trees with differing
 31 growth rates, maturation, and life span. Trees would be planted within the BDCP reserve system in
 32 areas that support high value foraging habitat in clumps of at least three trees each at appropriate
 33 sites within or adjacent to conserved cultivated lands, or they could be incorporated as a component
 34 of the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging
 35 habitat. Replacement trees that were incorporated into the riparian restoration would not be
 36 clustered in a single region of the study area, but would be distributed throughout the lands
 37 protected as foraging habitat for white-tailed kite. With this program in place, Alternative 4 would
 38 not have a substantial adverse effect on white-tailed kite in the near-term timeframe, either through
 39 direct mortality or through habitat modifications.

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
 45 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are
 46 described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)

1 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
2 [RDEIR/SDEIS, BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

3 **Late Long-Term Timeframe**

4 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
5 of modeled foraging habitat for white-tailed kite. Alternative 4 as a whole would result in the
6 permanent loss of and temporary effects on ~~677-680~~ acres of potential nesting habitat (5% of the
7 potential nesting habitat in the study area) and the loss or conversion of ~~59,793~~58,760 acres of
8 foraging habitat (12% of the foraging habitat in the study area). The locations of these losses are
9 described above in the analyses of individual conservation measures.

10 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
11 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
12 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
13 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
14 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
15 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
16 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
17 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
18 wetlands ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*).

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, of the Draft BDCP*).
22 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
23 habitat for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
24 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
25 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
26 would be increased by planting and maintaining native trees along roadsides and field borders
27 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
28 small but essential nesting habitat associated with cultivated lands would also be maintained and
29 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
30 farmyards or at rural residences (Objective CLNC1.3).

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, 8, and 11 would be associated with vernal pool and alkali
33 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
34 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
35 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
36 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
37 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
38 Foraging opportunities would also be improved by enhancing prey populations through the
39 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
40 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
41 would also be protected and maintained as part of the cultivated lands reserve system which would
42 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
43 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
44 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as

1 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
2 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
3 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide
4 foraging habitat for white-tailed kite would be protected by the late long-term time period
5 (Objective CLNC1.1).

6 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
7 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
8 above could result in the restoration of 3,800 acres and the protection of 570 acres of nesting
9 habitat and the restoration of 49,875 acres and the protection of 2,050 acres of foraging habitat for
10 white-tailed kite.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
18 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
19 *[RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

20 **NEPA Effects:** The loss of white-tailed kite habitat and potential direct mortality of this special-
21 status species under Alternative 4 would represent an adverse effect in the absence of other
22 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,
23 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, [AMM10,](#)
24 [and AMM18-AMM39 Swainson's Hawk and White-Tailed Kite,](#) which would be in place throughout the
25 construction period, the effects of habitat loss and potential mortality on white-tailed kite under
26 Alternative 4 would not be adverse.

27 **CEQA Conclusion:**

28 **Near-Term Timeframe**

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
30 the near-term BDCP conservation strategy has been evaluated to determine whether it would
31 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
32 the effect of construction would be less than significant under CEQA. Alternative 4 would remove
33 ~~449,452~~ acres (~~338,343~~ acres of permanent loss, ~~111,109~~ acres of temporary loss) of white-tailed
34 kite nesting habitat in the study area in the near-term. These effects would result from the
35 construction of the water conveyance facilities (CM1, ~~49,52~~ acres), and implementing other
36 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
37 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration—400 acres). In addition, [13,840](#)*
38 *[14,873](#) acres ([12,143 acres of permanent loss, 1,697 acres of temporary loss](#)) of white-tailed kite*
39 *foraging habitat would be removed or converted in the near-term (CM1, [5,6344,601](#) acres; *CM2 Yolo**
40 **Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally**
41 **Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland**
42 **Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,**
43 **CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—**
44 *9,239 acres).*

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 white-tailed kite in Chapter 3.
 3 *Conservation Strategy*, of the *Draft BDCP* would be 1:1 for restoration/creation and 1:1 protection of
 4 valley/foothill riparian habitat for nesting habitat, and 1:1 protection for foraging habitat. Using
 5 these ratios would indicate that ~~49~~52 acres of nesting habitat should be restored/ created and ~~49~~
 6 52 acres should be protected to mitigate the CM1 losses of white-tailed kite nesting habitat. In
 7 addition, ~~5,6344,601~~ acres should be protected to compensate for the CM1 losses of white-tailed kite
 8 foraging habitat. The near-term effects of other conservation actions would remove 400 acres of
 9 modeled nesting habitat, and therefore require 400 acres of restoration and 400 acres of protection
 10 of nesting habitat. Similarly, the near-term effects of other conservation actions would result in the
 11 loss or conversion of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of
 12 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and
 13 1:1 for protection of nesting habitat; 1:1 for restoration and 1:1 for protection of foraging habitat).

14 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
 15 valley/foothill riparian natural community, 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 (*see* Table 3-4 in Chapter 3, *Description of*
 20 *Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3, CM4, CM7,
 21 and CM8 and would occur in the same timeframe as the construction and early restoration losses.

22 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
 23 system with extensive wide bands or large patches of valley/foothill riparian natural community
 24 (Objectives VFRNC1.1 and VFRNC1.2 in ~~BDCP~~ Chapter 3, *Conservation Strategy, of the Draft BDCP*).
 25 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
 26 habitat for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
 27 Swainson’s hawks and therefore requires wide patches of nesting habitat where its range overlaps
 28 with Swainson’s hawk. The distribution and abundance of potential white-tailed kite nest trees
 29 would be increased by planting and maintaining native trees along roadsides and field borders
 30 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
 31 small but essential nesting habitat associated with cultivated lands would also be maintained and
 32 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
 33 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, 8, and 11 would be associated with vernal pool and alkali
 36 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 37 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 38 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
 39 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
 40 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 41 Foraging opportunities would also be improved by enhancing prey populations through the
 42 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
 43 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
 44 would also be protected and maintained as part of the cultivated lands reserve system which would
 45 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
 46 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland

1 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
 2 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
 3 of tidal natural communities, including transitional uplands would provide high-value foraging
 4 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
 5 covered and other native wildlife species would be protected in the near-term time period
 6 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection
 7 and restoration efforts and represent performance standards for considering the effectiveness of
 8 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
 9 and the additional detail in the biological objectives satisfy the typical mitigation that would be
 10 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
 11 the near-term effects of the other conservation measures.

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 white-tailed kite nesting habitat. The 800 acres of restored riparian
 15 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 16 require one to several decades to functionally replace habitat that has been affected and for trees to
 17 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
 18 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
 19 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 would further reduce this limited resource and could reduce or restrict the number of active
 23 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an*
 31 *updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this*
 32 *RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.*

33 *AMM18-AMM39 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large
 34 mature trees, including transplanting trees scheduled for removal. These would be supplemented
 35 with additional saplings and would be expected to reduce the temporal effects of loss of nesting
 36 habitat. The plantings would occur prior to or concurrent with (in the case of transplanting) the loss
 37 of trees. In addition, at least five trees (5-gallon container size) would be planted within the BDCP
 38 reserve system for every tree 20 feet or taller anticipated to be removed by construction during the
 39 near-term period. A variety of native tree species would be planted to provide trees with differing
 40 growth rates, maturation, and life span. Trees would be planted within the BDCP reserve system in
 41 areas that support high value foraging habitat in clumps of at least three trees each at appropriate
 42 sites within or adjacent to conserved cultivated lands, or they could be incorporated as a component
 43 of the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging
 44 habitat. Replacement trees that were incorporated into the riparian restoration would not be
 45 clustered in a single region of the study area, but would be distributed throughout the lands
 46 protected as foraging habitat for white-tailed kite.

1 To enhance white-tailed kite reproductive output until the replacement nest trees become suitable
2 for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected in the
3 near-term for each potential nest site removed (a nest site is defined as a 125-acre block in which
4 more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity
5 during the near-term. The foraging habitat to be protected would be within 6 kilometers of the
6 removed tree within an otherwise suitable foraging landscape and on land not subject to threat of
7 seasonal flooding, construction disturbances, or other conditions that would reduce the foraging
8 value of the land. With this program in place, Alternative 4 would not have a substantial adverse
9 effect on white-tailed kite in the near-term timeframe, either through direct mortality or through
10 habitat modifications. Therefore, Alternative 4 would have a less-than-significant impact on
11 Swainson's hawks.

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 **Late Long-Term Timeframe**

20 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
21 of modeled foraging habitat for white-tailed kite. Alternative 4 as a whole would result in the
22 permanent loss of and temporary effects on ~~677-680~~ acres of potential nesting habitat (5% of the
23 potential nesting habitat in the study area) and the loss or conversion of ~~59,793,58,760~~ acres of
24 foraging habitat (12% of the foraging habitat in the study area).

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 (see Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*).

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, of the Draft BDCP*).
37 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
38 habitat 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~~ see Chapter 5, Section 5.6, *Effects on Covered Wildlife*
23 *and Plant Species*, of the Draft BDCP) estimates that the restoration and protection actions discussed
24 above could result in the restoration of 3,800 acres and the protection of 570 acres of nesting
25 habitat and the restoration of 49,875 acres and the protection of 2,050 acres of foraging habitat for
26 white-tailed kite.

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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an*
34 *updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this*
35 *RDEIR/SDEIS. BDCP Appendix 3.C, Avoidance and Minimization Measures.*

36 Considering In the absence of other conservation actions, the effects on white-tailed kite habitat
37 from Alternative 4 would represent an adverse effect as a result of habitat modification and potential
38 for direct mortality of a special status species; however, considering Alternative 4's protection and
39 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
40 greater than necessary to compensate for the time lag of restoring riparian and foraging habitats
41 lost to construction and restoration activities, and with implementation of AMM1–AMM7, AMM10,
42 and AMM18-AMM39 Swainson's Hawk and White-Tailed Kite, the loss of habitat or direct mortality
43 through implementation of Alternative 4 would not result in a substantial adverse effect through
44 habitat modifications and would not substantially reduce the number or restrict the range of white-
45 tailed kite. In particular, 95% of the loss of foraging habitat effects involve the conversion from one

1 habitat type to another form of suitable foraging habitat. Therefore, the loss of habitat or potential
2 mortality under this alternative would have a less-than-significant impact on white-tailed kite.

3 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 4 **Facilities**

5 There are several known occurrences of nesting white-tailed kite within 5 miles of the proposed
6 transmission line alignment. While white-tailed kite flight behavior puts them regularly within the
7 range of heights proposed for the new transmission lines (50 to 110 feet), their keen vision and high
8 maneuverability substantially reduce powerline collision risk for the species. Like other diurnal
9 raptors, white-tailed kites have highly developed eyesight (Jones et al. 2007), allowing them to
10 detect small prey while hunting from relatively high altitudes. Keen eyesight also allows for
11 detection and avoidance of other aerial objects, including above-ground utility lines. Like many
12 other falcons, the white-tailed kite has long, narrow, tapered wings and body size that allow for
13 efficient soaring flight and highly developed aerial maneuverability. White-tailed kite are at low risk
14 of bird strike mortality from the construction of new transmission lines based on its general
15 maneuverability, its keen eyesight, and lack of flocking behavior (BDCP Attachment 5.J-2,
16 Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines). Marking
17 transmission lines with flight diverters that make the lines more visible to birds has been shown to
18 dramatically reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)
19 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. With the
20 implementation of AMM20 Greater Sandhill Crane, all new transmission lines would be fitted with
21 flight diverters, which would substantially reduce any risk of collision with lines. New transmission
22 lines would increase the risk that white-tailed kites could be subject to power line strikes and/or
23 electrocution, which could result in injury or mortality of individuals. This species would be at low
24 risk of bird strike mortality based on its general maneuverability, its keen eyesight, and lack of
25 flocking behavior (BDCP Attachment 5.J-2, Memorandum: Analysis of Potential Bird Collisions at
26 Proposed BDCP Transmission Lines). AMM20 Greater Sandhill Crane would further reduce any
27 potential effects.

28 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
29 adverse effect because the risk of bird strike is considered to be minimal based on the species'
30 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, AMM20 Greater
31 Sandhill Crane contains the commitment to place bird strike diverters on all new powerlines, which
32 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite from
33 the project. Therefore, the construction and operation of new transmission lines under Alternative 4
34 would not result in an adverse effect on white-tailed kite. New transmission lines would minimally
35 increase the risk for white-tailed kite power line strikes. However, the species would be at a low risk
36 of bird strike mortality based on its general maneuverability, its keen eyesight and lack of flocking
37 behavior. With the implementation of AMM20 Greater Sandhill Crane the potential effect of the
38 construction of new transmission lines on white-tailed kite would not be adverse.

39 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent a
40 significant impact because the risk of bird strike is considered to be minimal based on the species'
41 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, AMM20 Greater
42 Sandhill Crane contains the commitment to place bird strike diverters on all new powerlines, which
43 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite from
44 the project. Therefore, the construction and operation of new transmission lines under Alternative 4
45 would result in a less-than-significant impact on white-tailed kite. New transmission lines would

~~increase the risk for white-tailed kite power line strikes and/or electrocution. However, the species would be at a low risk of bird strike mortality based on its general maneuverability, its keen eyesight and lack of flocking behavior. AMM20 Greater Sandhill Crane, would further reduce any potential impact of the construction of new transmission lines on white-tailed kite to a less than significant level.~~

Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite

White-tailed kite nesting habitat within the vicinity of proposed construction areas could be indirectly affected by construction activities. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (~~Draft BDCP~~ Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4 in Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS), although there are no available data to determine the extent to which these noise levels could affect white-tailed kite. Indirect effects associated with construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside the project footprint but within 1,300 feet from the construction edge. If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting habitat for these species. ~~AMM18-AMM39 Swainson's Hawk and White-Tailed Kite~~ would require preconstruction surveys, and if detected, 200-yard no-disturbance buffers would be established around active nests. The use of mechanical equipment during water conveyance facilities construction could cause the accidental release of petroleum or other contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the species. AMM1-AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from the construction area and negative effects of dust on active nests.

Methylmercury Exposure: Covered activities have the potential to exacerbate bioaccumulation of mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of mercury (see ~~BDCP~~ Chapter 3, *Conservation Strategy*, of the Draft BDCP for details of restoration). Increased methylmercury associated with natural community and floodplain restoration may indirectly affect white-tailed kite (see ~~BDCP~~ Appendix 5.D, *Contaminants*, of the Draft BDCP). However, the potential mobilization or creation of methylmercury within the study area varies with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury Management* (as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS) includes provisions for project-specific Mercury Management Plans. Site-specific restoration plans that address the creation and mobilization of mercury, as well as monitoring and adaptive management as described in CM12 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and 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, of the Draft BDCP](#) for details of restoration). Changes in
28 selenium concentrations were analyzed in Chapter 8, *Water Quality, of the Draft EIR/EIS* and it was
29 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
30 in substantial, long-term increases in selenium concentrations in water in the Delta under any
31 alternative. However, it is difficult to determine whether the effects of potential increases in
32 selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)
33 would lead to adverse 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* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)[BDCP Appendix 3.G,](#)
38 [Avoidance and Minimization Measures](#)) which would provide specific tidal habitat restoration design
39 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
40 habitats. Furthermore, the effectiveness of selenium management to reduce selenium
41 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
42 part of design and implementation. This avoidance and minimization measure would be
43 implemented as part of the tidal habitat restoration design schedule.

1 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 2 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation
 3 and maintenance of the water conveyance facilities, including the transmission facilities, could result
 4 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the
 5 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and
 6 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative
 7 4 would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7,
 8 and ~~AMM18-AMM39 Swainson’s Hawk and White-Tailed Kite~~. Tidal habitat restoration could result in
 9 increased exposure of white-tailed kite 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 indirect effects associated with noise and visual disturbances,
 13 potential spills of hazardous material, and increased exposure to selenium from Alternative 4
 14 implementation would not have an adverse effect on white-tailed kite. Tidal habitat restoration is
 15 unlikely to have an adverse effect on white-tailed kite through increased exposure to
 16 methylmercury, as kites currently forage in tidal marshes where elevated methylmercury levels
 17 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and
 18 the potential for increased exposure varies substantially within the study area. Site-specific
 19 restoration plans in addition to monitoring and adaptive management, described in *CM12*
 20 *Methylmercury Management* ([as revised in Appendix D, Substantive BDCP Revisions, in this](#)
 21 [RDEIR/SDEIS](#)), would address the uncertainty of methylmercury levels in restored tidal marsh. 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 white-tailed kite, once site specific sampling and
 24 other information could be developed.

25 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
 26 operations and maintenance of the water conveyance facilities under Alternative 4 would have a
 27 less-than-significant impact on white-tailed kite with the implementation of ~~AMM18-AMM39~~
 28 ~~Swainson’s Hawk and White-Tailed Kite~~, and AMM1–AMM7. Tidal habitat restoration could result in
 29 increased exposure of white-tailed kite to selenium. This effect would be addressed through the
 30 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
 31 restoration design elements to reduce the potential for bioaccumulation of selenium and its
 32 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or
 33 floodplain restoration could result in increased exposure of white-tailed kite to methylmercury.
 34 However, it is unknown what concentrations of methylmercury are harmful to this species. *CM12*
 35 *Methylmercury Management* includes provisions for project-specific Mercury Management Plans.
 36 Site-specific restoration plans that address the creation and mobilization of mercury, as well as
 37 monitoring and adaptive management as described in *CM12*, would better inform potential impacts
 38 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area on
 39 white-tailed kite. With these measures in place, the indirect effects associated with noise and visual
 40 disturbances, potential spills of hazardous material, and increased exposure to selenium from
 41 Alternative 4 implementation would have a less-than-significant impact on white-tailed kite.

1 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (related to *CM2 Yolo Bypass Fisheries*
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 48–82
5 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed
6 kite foraging habitat (Table 12-4-41). During inundation years, affected cultivated lands and
7 grassland would not be available as foraging habitat until prey populations have re-inhabited
8 inundated areas. This would result in temporary periodic reduction in availability of foraging
9 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,
10 there could be a further loss of foraging habitat value if the crop type that would have been planted
11 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite
12 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse
13 effect on nest sites that may be within the inundation area because existing trees already withstand
14 floods in the area, the increase in inundation frequency and duration is expected to remain within
15 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

16 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
17 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402
18 acres of modeled white-tailed kite foraging habitat (Table 12-4-41). Inundation of foraging habitat
19 could result in a periodic reduction of available foraging habitat due to the reduction in available
20 prey. Following draw-down, inundated habitats are expected to recover and provide suitable
21 foraging conditions until the following inundation period. Thus, this is considered a periodic impact
22 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the study
23 area.

24 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more
25 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting
26 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because
27 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

28 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite
29 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
30 draw-down. Any effects are considered short-term and would not result in an adverse effect.

31 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite
32 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
33 draw-down. Any effects are considered short-term and would be expected to have a less-than-
34 significant impact on white-tailed kite.

35 **Yellow-Breasted Chat**

36 This section describes the effects of Alternative 4, including water conveyance facilities construction
37 and implementation of other conservation components, on yellow-breasted chat. Yellow-breasted
38 chat modeled habitat includes suitable nesting and migratory habitat as those plant alliances from
39 the valley/foothill riparian modeled habitat that contain a shrub component and an overstory
40 component. Primary nesting and migratory habitat is qualitatively distinguished from secondary
41 habitat in Delta areas as those plant associations that support a greater percentage of a suitable
42 shrub cover, particularly blackberry, and California wild rose, and have an open to moderately dense
43 overstory canopy, using data from Hickson and Keeler-Wolf (2007). No distinction is made between

1 primary and secondary habitat for Suisun Marsh/Yolo Basin habitats because supporting
2 information is lacking.

3 Construction and restoration associated with Alternative 4 conservation measures would result in
4 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table
5 12-4-42. Full implementation of Alternative 4 would also include the following conservation actions
6 over the term of the BDCP to benefit the yellow-breasted chat (~~BDCP-see~~ Chapter 3, Section 3.3,
7 *Biological Goals and Objectives*, of the Draft BDCP).

- 8 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
9 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
10 associated with CM7).
- 11 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
12 10 (Objective VFRNC1.2, associated with CM3).
- 13 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
14 overlap among vegetation components and over adjacent riverine channels, freshwater
15 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 16 • Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed
17 understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,
18 associated with CM7).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to
20 management activities that would enhance these natural communities for the species and
21 implementation of AMM1–AMM7, AMM10 Restoration of Temporarily Affected Natural Communities,
22 and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed
23 Cuckoo, impacts on yellow-breasted chat would not be adverse for NEPA purposes and would be less
24 than significant for CEQA purposes.

1
2

Table 12-4-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	1716	1716	616	<u>16</u>	NA	NA
	Secondary	1117	1117	1710	1710	NA	NA
	Suisun Marsh/ Upper Yolo Bypass	0	0	0	0	NA	NA
Total Impacts CM1		2833	2833	2326	2326		
CM2-CM18	Primary	96	214	58	73	19-38	92
	Secondary	209	357	0	6	6-18	56
	Suisun Marsh/ Upper Yolo Bypass	76	85	29	29	23-32	0
Total Impacts CM2-CM18		381	656	87	1021 <u>08</u>	48-88	148
Total Primary		1131 <u>12</u>	2312 <u>30</u>	6474	7989	19-38	92
Total Secondary		2202 <u>26</u>	3683 <u>74</u>	1710	2316	6-18	56
Total Suisun Marsh/Upper Yolo Bypass		76	85	29	29	23-32	0
TOTAL IMPACTS		4094 <u>14</u>	6846 <u>89</u>	11011 <u>3</u>	1311 <u>34</u>	48-88	148

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted Chat

4
5

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to ~~815-823~~ acres of modeled nesting and migratory habitat for yellow-breasted chat (~~684-689~~
8 acres of permanent loss, ~~131-134~~ acres of temporary loss, Table 12-4-42). Conservation measures
9 that would result in these losses are conveyance facilities and transmission line construction, and
10 establishment and use of ~~reusable tunnel material 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 yellow-breasted chat 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.

- CM1 Water Facilities Construction and Operation: Construction of Alternative 4 conveyance facilities would result in the combined permanent and temporary loss of up to ~~23-32~~ acres of primary habitat (~~17-16~~ acres of permanent loss, ~~16~~ acres of temporary loss). In addition, ~~28-27~~ acres of secondary habitat would be removed (~~11-17~~ acres of permanent loss, ~~17-10~~ acres of temporary loss, Table 12-4-42). Activities that would impact modeled habitat consist of tunnel, forebay, and intake construction, permanent and temporary access roads, and construction of transmission lines, barge unloading facilities and temporary work areas. Impacts from CM1 would occur in the central delta in CZs 3- 6, and 8. Most of the permanent loss of habitat would occur where Intakes 2, 3, and 5 impact 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. Some habitat would be lost due to construction of a permanent access road from the new forebay west to a reusable tunnel material disposal area and where the realigned Highway 160 would cross Snodgrass Slough. Permanent habitat loss would also occur along Lambert Road where permanent utility lines would be installed and from the construction of an operable barrier at the confluence of Old River and the San Joaquin River. Temporary loss of habitat would occur from the construction of a barge unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary work areas surround intake sites. The riparian habitat in these areas is also composed of very small patches or stringers bordering waterways, which are composed of valley oak and scrub vegetation. Impacts from CM1 would occur in the central delta in CZs 3-6, and 8.

This lossHabitat loss from CM1 activities would have the potential to displace individuals, if present, and remove the functions and value of modeled habitat for nesting, protection, or foraging. There are no occurrences of yellow-breasted chat that overlap with the CM1 construction footprint. The implementation of AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo (Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP)~~BDCP Appendix 3.C, Avoidance and Minimization Measures~~ would minimize the effects of construction on nesting yellow-breasted chats if they were to occur in the area. Refer to the Terrestrial Biology Map ~~Book~~ in Appendix A of this RDEIR/SDEIS for a detailed view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-~~14~~ years of Alternative 4 implementation.

- CM2 Yolo Bypass Fisheries Enhancement: Construction of the Yolo bypass fisheries enhancement would permanently remove approximately 83 acres and temporarily remove 88 acres of yellow-breasted chat habitat in the Yolo Bypass in CZ 2. The loss is expected to occur during the first 10 years of Alternative 4 implementation.
- CM4 Tidal Natural Communities Restoration: Tidal habitat restoration site preparation and inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
2 seasonally inundated floodplain would permanently and temporarily remove approximately 49
3 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of
4 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.
5 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of
6 valley/foothill riparian habitat would be restored as a component of seasonally inundated
7 floodplain restoration actions. The actual number of acres that would be restored may differ
8 from these estimates, depending on how closely the outcome of seasonally inundated floodplain
9 restoration approximates the assumed outcome. Once this restored riparian vegetation has
10 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat
11 habitat.
- 12 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
13 activities that could be implemented in protected yellow-breasted chat habitats would be
14 expected to maintain and improve the functions of the habitat over the term of the BDCP.
15 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which
16 would maintain conditions favorable for the chat's use of the study area.
- 17 Habitat management- and enhancement-related activities could disturb yellow-breasted chat
18 nests if they are present near work sites. Equipment operation could destroy nests, and noise
19 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and
20 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*
21 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-
22 breasted chat or other adverse effects.
- 23 Occupied habitat would be monitored to determine if there is a need to implement controls on
24 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions
25 would be expected to benefit the yellow-breasted chat by removing a potential stressor that
26 could, if not addressed, adversely affect the stability of newly established populations.
- 27 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
28 *and Management* that are designed to enhance wildlife values in restored riparian habitats may
29 result in localized ground disturbances that could temporarily remove small amounts of yellow-
30 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
31 road and other infrastructure maintenance activities, are expected to have minor adverse effects
32 on available yellow-breasted chat habitat and are expected to result in overall improvements to
33 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.
- 34 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
35 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
36 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
37 habitat. Maintenance activities would include vegetation management, levee and structure
38 repair, and re-grading of roads and permanent work areas. These effects, however, would be
39 reduced by AMMs and conservation actions as described below.
- 40 • *Injury and Direct Mortality*: Construction is not expected to result in direct mortality of yellow-
41 breasted chat because adults and fledged young are expected to occur only in very small
42 numbers and, if present, would avoid contact with construction and other equipment. If yellow-
43 breasted chat were to nest in the vicinity of construction activities, equipment operation could
44 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*

1 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid
2 and minimize this effect.

- 3 • Permanent and temporary habitat losses from the above CMs, would primarily consist of small,
4 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
5 Temporarily affected areas would be restored as riparian habitat within 1 year following
6 completion of construction activities [as described in AMM10 Restoration of Temporarily Affected](#)
7 [Natural Communities](#). Although the effects are considered temporary, the restored riparian
8 habitat would require 5 years to several decades, for ecological succession to occur and for
9 restored riparian habitat to functionally replace habitat that has been affected. The majority of
10 the riparian vegetation to be temporarily removed is early- to mid-successional; therefore, the
11 replaced riparian vegetation would be expected to have structural components comparable to
12 the temporarily removed vegetation within the first 5 to 10 years after the initial restoration
13 activities are complete.

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 conclusions are also
16 included.

17 ***Near-Term Timeframe***

18 Because the water conveyance facilities 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 construction would not be adverse under NEPA. Alternative 4 would remove [519-527](#)
22 acres of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects
23 would result from the construction of the water conveyance facilities (CM1, [51-59](#) acres of modeled
24 nesting and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
25 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*
26 *Floodplain Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses
27 would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-
28 value habitat for the species.

29 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
30 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
31 [3, Conservation Strategy](#), of the [Draft](#) BDCP would be 1:1 for restoration/creation and 1:1 protection
32 of valley/foothill riparian habitat. Using these ratios would indicate that [51-59](#) acres of
33 valley/foothill riparian habitat should be restored/created and [51-59](#) acres should be protected to
34 compensate for the CM1 losses of yellow-breasted chat habitat. The near-term effects of other
35 conservation actions would remove 468 acres of modeled habitat, and therefore require 468 acres
36 of restoration and 468 acres of protection of valley/foothill riparian using the same typical NEPA
37 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 study area ([see](#) Table 3-4 in Chapter 3, *Description*
40 *of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM7
41 and would occur in the same timeframe as the construction and early restoration losses, thereby
42 avoiding adverse effects of habitat loss on yellow-breasted chat. The majority of the riparian
43 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
44 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in [BDCP](#)

1 Chapter 3, *Conservation Strategy*, of the Draft BDCP). Goals and objectives in the Plan for riparian
2 restoration also include the restoration, maintenance and enhancement of structural heterogeneity
3 with adequate vertical and horizontal overlap among vegetation components and over adjacent
4 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). The yellow-
5 breasted chat has specific structural habitat requirements, so only the early- to mid-successional
6 portions of the restored and protected riparian natural would be expected to provide suitable
7 habitat characteristics for the species. These natural community biological goals and objectives
8 would inform the near-term protection and restoration efforts and represent performance
9 standards for considering the effectiveness of conservation actions for the species.

10 The acres of protection contained in the near-term Plan goals and the additional detail in the
11 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
12 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
13 conservation measures. The restored riparian habitat could require 5 years to several decades, for
14 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
15 has been affected. However, because the modeled habitat impacted largely consists of small patches
16 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse
17 population-level effect on the species in the near-term time period.

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 [Appendix 3.C, Avoidance and Minimization](#)
26 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)
27 [Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization](#)
28 [Measures.](#)

29 **Late Long-Term Timeframe**

30 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
31 nesting and migratory habitat for yellow-breasted chat. Alternative 4 as a whole would result in the
32 permanent loss of and temporary effects on [815-823](#) acres of modeled habitat (6% of the modeled
33 habitat in the study area). These losses would occur from the construction of the water conveyance
34 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
35 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
36 would be in fragmented riparian habitat throughout the study area.

37 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
38 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
39 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
40 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
41 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
42 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
43 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
44 the restored and protected riparian natural would be expected to provide suitable habitat

1 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
 2 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
 3 natural erosion and deposition, which would provide conditions conducive to the establishment of
 4 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
 5 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
 6 population in the study area, a cowbird control program would be implemented through *CM11*
 7 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
 8 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
 9 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

10 The BDCP's beneficial effects analysis (~~BDCP-see~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife*
 11 *and Plant Species*, ~~of the Draft BDCP~~) estimates that the restoration and protection actions discussed
 12 above could result in the restoration of 2,683 acres and the protection of 594 acres of habitat for the
 13 yellow-breasted chat.

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*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
 19 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would
 20 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and
 21 storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization](#)
 22 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)
 23 [Substantive BDCP Revisions, of this RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization](#)
 24 [Measures.](#)

25 **NEPA Effects:** The loss of yellow-breasted chat habitat and potential direct mortality of this special-
 26 status species would represent an adverse effect in the absence of other conservation actions. The
 27 restored riparian habitat would require 5 years to several decades, for ecological succession to
 28 occur and for restored riparian habitat to functionally replace habitat that has been affected.
 29 However, the habitat that would be lost consists of small, fragmented riparian stands that would not
 30 provide high-value habitat for the species. And because the nesting and migratory habitat that
 31 would be lost is small relative to the species' range throughout California and North America,
 32 Alternative 4 actions would not be expected to have an adverse population-level effect on the
 33 species. With habitat protection and restoration associated with CM3, CM7, and CM11, guided by
 34 biological goals and objectives and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best*
 35 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*
 36 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*
 37 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge*
 38 *Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
 39 *Yellow-Billed Cuckoo*, which would be in place ~~during all project activities throughout the~~
 40 ~~construction period~~, the effects of habitat loss and potential mortality on yellow-breasted chat under
 41 Alternative 4 would not be adverse.

42 **CEQA Conclusion:**

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 impact of construction would be less than significant under CEQA. Alternative 4 would remove ~~519~~
6 ~~527~~ acres of modeled habitat for yellow-breasted chat in the study area in the near-term. These
7 effects would result from the construction of the water conveyance facilities (CM1, ~~51-59~~ acres of
8 modeled nesting and migratory habitat), and implementing other conservation measures (*CM2 Yolo*
9 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
10 *Inundated Floodplain Restoration*—468 acres of modeled nesting and migratory habitat). These
11 habitat losses would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not
12 provide high-value 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, *Conservation Strategy*, of the *Draft BDCP* would be 1:1 for restoration/creation and 1:1 protection
16 of valley/foothill riparian habitat. Using these ratios would indicate that ~~51-59~~ acres of
17 valley/foothill riparian habitat should be restored/created and ~~51-59~~ acres should be protected to
18 mitigate the CM1 losses of yellow-breasted chat habitat. The near-term effects of other conservation
19 actions would remove 468 acres of modeled habitat, and therefore require 468 acres of restoration
20 and 468 acres of protection of valley/foothill riparian using the same typical NEPA and CEQA ratios
21 (1:1 for restoration and 1:1 for 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 study area (*see* Table 3-4 in Chapter 3, *Description*
24 *of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3 and CM7
25 and would occur in the same timeframe as the construction and early restoration losses, thereby
26 avoiding adverse effects of habitat loss on yellow-breasted chat. The majority of the riparian
27 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
28 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in *BDCP*
29 Chapter 3, *Conservation Strategy, of the Draft BDCP*). Goals and objectives in the Plan for riparian
30 restoration also include the restoration, maintenance and enhancement of structural heterogeneity
31 with adequate vertical and horizontal overlap among vegetation components and over adjacent
32 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). The yellow-
33 breasted chat has specific structural habitat requirements, so only the early- to mid-successional
34 portions of the restored and protected riparian natural would be expected to provide suitable
35 habitat characteristics for the species. These natural community biological goals and objectives
36 would inform the near-term protection and restoration efforts and represent performance
37 standards for considering the effectiveness of conservation actions for the species.

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 Attachment 5].C, Analysis of Potential Bird Collisions at Proposed BDCP Powerlines, AMM7
43 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,
44 Western Yellow-Billed Cuckoo. All of these AMMs include elements that would avoid or minimize the
45 risk of affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs

1 are described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and
2 an updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
3 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

4 In the absence of other conservation actions, the effects on least Bell's vireo and yellow warbler
5 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and
6 potential for direct mortality of special-status species. The acres of protection contained in the near-
7 term Plan goals and the additional detail in the biological objectives for yellow-breasted chat satisfy
8 the typical mitigation ratios that would be applied to the project-level effects of CM1, as well as
9 mitigate the near-term effects of the other conservation measures. The restored riparian habitat
10 could require 5 years to several decades, for ecological succession to occur and for restored riparian
11 habitat to functionally replace habitat that has been affected. However, because the modeled habitat
12 impacted largely consists of small patches of blackberry, willow, and riparian scrub, temporal losses
13 of potential habitat as a result of BDCP actions would be expected to have a less-than-significant
14 population-level impact on the species in the near-term time period.

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 Attachment 5J.C, Analysis of Potential Bird Collisions at Proposed BDCP Powerlines, AMM7~~
20 ~~Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow Breasted Chat, Least Bell's Vireo,~~
21 ~~Western Yellow-Billed Cuckoo. All of these AMMs include elements that would avoid or minimize the~~
22 ~~risk of affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs~~
23 ~~are described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.~~

24 Considering the conservation actions described above, and AMMs 1-7 and AMM 22, Alternative 4,
25 over the term of the BDCP would not result in a substantial adverse effect through habitat
26 modifications and would not substantially reduce the number or restrict the range of yellow-
27 breasted chat. Therefore, Alternative Alternative 4 would have a less-than-significant impact on
28 yellow-breasted chat.

29 **Late Long-Term Timeframe**

30 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
31 nesting and migratory habitat for yellow-breasted chat. Alternative 4 as a whole would result in the
32 permanent loss of and temporary effects on ~~815-823~~ acres of modeled habitat (6% of the modeled
33 habitat in the study area). These losses would occur from the construction of the water conveyance
34 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
35 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
36 would be in fragmented riparian habitat throughout the study area.

37 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
38 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
39 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
40 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
41 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
42 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
43 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
44 the restored and protected riparian natural would be expected to provide suitable habitat

1 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
2 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
3 natural erosion and deposition, which would provide conditions conducive to the establishment of
4 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
5 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
6 population in the study area, a cowbird control program would be implemented through *CM11*
7 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
8 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
9 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

10 The BDCP's beneficial effects analysis (~~BDCP~~ see Chapter 5, Section 5.6, *Effects on Covered Wildlife*
11 *and Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
12 above could result in the restoration of 2,683 acres and the protection of 594 acres of habitat for the
13 yellow-breasted chat.

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, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
19 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would
20 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and
21 storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization](#)
22 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)
23 [Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization](#)
24 [Measures.](#)

25 [In the absence of other conservation actions, the effects on least Bell's vireo and yellow warbler](#)
26 [habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and](#)
27 [potential for direct mortality of special-status species.](#) Considering Alternative 4's protection and
28 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
29 suitable to compensate for habitats lost to construction and restoration activities, and with
30 implementation of AMM1–AMM7, [AMM10](#), and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
31 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or direct mortality through
32 implementation of Alternative 4 would not result in a substantial adverse effect through habitat
33 modifications and would not substantially reduce the number or restrict the range of the species.
34 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
35 significant impact on yellow-breasted chat.

36 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing** 37 **the Water Conveyance Facilities**

38 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance
39 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could
40 temporarily reduce the extent of and functions supported by the affected habitat. Because of the
41 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and
42 because *CM5 Seasonally Inundated Floodplain Restoration* would restore and protect contiguous
43 high-value riparian habitat in CZ 7, any such habitat fragmentation is expected to have no or
44 minimal effect on the species.

1 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-
2 breasted chat. The habitat functions for the species would be significantly improved through the
3 implementation of CM5, which would restore and protect large contiguous patches of riparian
4 habitat.

5 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on
6 yellow-breasted chat. The habitat functions for the species would be significantly improved through
7 the implementation of CM5, which would restore and protect large contiguous patches of riparian
8 habitat.

9 **Impact BIO-106: Effects on Yellow-Breasted Chat 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 western yellow-billed cuckoo.~~ Yellow-breasted chats are migratory and
13 usually arrive at California breeding grounds in April from their wintering grounds in Mexico and
14 Guatemala. Departure for wintering grounds occurs from August to September. These are periods of
15 relative high visibility when the risk of powerline collisions will be low. The species' small, relatively
16 maneuverable body; its foraging behavior; and its presence in the Plan Area during the summer
17 contribute to a low risk of collision with the proposed transmission lines (BDCP Attachment 5.J-2,
18 *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Marking
19 transmission lines with flight diverters that make the lines more visible to birds has been shown to
20 dramatically reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)
21 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. All new
22 project transmission lines would be fitted with flight diverters. Bird flight diverters would further
23 reduce any potential for powerline collisions.~~New transmission lines would therefore not be~~
24 ~~expected to have an adverse effect on yellow-breasted chat.~~

25 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
26 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal
27 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in
28 the Plan Area during the summer during periods of high visibility. Under AMM20 Greater Sandhill
29 Crane, all new project transmission lines would be fitted with bird diverters which would further
30 reduce any potential for powerline collisions.

31 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
32 significant impact on yellow-breasted chat because the risk of bird strike is considered to be
33 minimal based on the species' small, relatively maneuverable body; its foraging behavior; and its
34 presence in the Plan Area during the summer during periods of high visibility. Under AMM20 Greater
35 Sandhill Crane, all new project transmission lines would be fitted with bird diverters which would
36 further reduce any potential for powerline collisions.

37 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

38 Noise and visual disturbances associated with construction-related activities could result in
39 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to
40 proposed construction areas. Construction noise above background noise levels (greater than 50
41 dBA) could extend 500 to 5,250 feet from the edge of construction activities (~~Draft BDCP~~ Appendix
42 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
43 *Crane*, Table 4 in Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS), although there are no

1 available data to determine the extent to which these noise levels could affect yellow-breasted chat.
 2 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
 3 grading, filling, contouring, and other ground-disturbing operations outside the project footprint but
 4 within 1,300 feet from the construction edge. If yellow-breasted chat were to nest in or adjacent to
 5 work areas, construction and subsequent maintenance-related noise and visual disturbances could
 6 mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting
 7 habitat for these species. These potential effects would be minimized with incorporation of *AMM22*
 8 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* into the
 9 BDCP, which would ensure 250 foot no-disturbance buffers were established around active nests.
 10 The use of mechanical equipment during water conveyance facilities construction could cause the
 11 accidental release of petroleum or other contaminants that could affect yellow-breasted chat in the
 12 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to yellow-
 13 breasted chat habitat could also affect the species. *AMM1–AMM7*, including *AMM2 Construction Best*
 14 *Management Practices and Monitoring*, in addition to *AMM22 Suisun Song Sparrow, Yellow-Breasted*
 15 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would minimize the likelihood of such spills
 16 from occurring and ensure that measures were in place to prevent runoff from the construction area
 17 and any adverse effects of dust on active nests. If present, yellow-breasted chat individuals could be
 18 temporarily affected by noise and visual disturbances adjacent to water conveyance construction
 19 sites, reducing the use of an estimated 59 acres of modeled primary nesting and migratory habitat
 20 and 119 acres of secondary nesting and migratory habitat. *AMM22 Suisun Song Sparrow, Yellow-*
 21 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid and minimize this effect
 22 on the species.

23 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and
 24 sedimentation, and the potential impacts of operations and maintenance of the water conveyance
 25 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of
 26 *AMM1–AMM7*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
 27 *Yellow-Billed Cuckoo* into the BDCP.

28 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust
 29 and sedimentation, and the potential impacts of operations and maintenance of the water
 30 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the
 31 incorporation of *AMM1–AMM7*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
 32 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

33 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of**
 34 **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 48–88 acres of modeled yellow-breasted chat nesting and
 37 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or
 38 its habitat are expected because the chat breeding period is outside the period the weir would be
 39 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo
 40 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of
 41 these vegetation types.

42 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148
 43 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to
 44 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the

1 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains
2 is expected to restore a more natural flood regime in support of riparian vegetation types that
3 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal
4 inundation in existing riparian natural communities is likely to be beneficial because, historically,
5 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
6 flooding promotes the germination and establishment of many native riparian plants.

7 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain
8 restoration would be expected to create more natural flood regimes that would support riparian
9 habitat, which would ~~not~~ result in a beneficial effect on yellow breasted chat.

10 **CEQA Conclusion:** By creating more natural flood regimes that would support riparian habitat,
11 increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain restoration
12 would have a beneficial impact on yellow breasted chat.

13 **Cooper's Hawk and Osprey**

14 This section describes the effects of Alternative 4, including water conveyance facilities construction
15 and implementation of other conservation components, on Cooper's hawk and osprey. Although
16 osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will nest in
17 more developed landscapes, modeled nesting habitat for these species is restricted to valley/foothill
18 riparian forest.

19 Construction and restoration associated with Alternative 4 conservation measures would result in
20 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in
21 Table 12-4-43. The majority of the losses would take place over an extended period of time as tidal
22 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be
23 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats
24 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat
25 function would be minimized by specific requirements of *AMM18 Swainson's Hawk and White-Tailed*
26 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of
27 Alternative 4 would include the following conservation actions over the term of the BDCP which
28 would also benefit Cooper's hawk and osprey (~~BDCP see~~ Chapter 3, Section 3.3, *Biological Goals and*
29 *Objectives, of the Draft BDCP*).

- 30 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
31 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
32 associated with CM7)
- 33 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
34 10 (Objective VFRNC1.2, associated with CM3).
- 35 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
36 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 37 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
38 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
39 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
40 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).

41 As explained below, with the acres of restoration or protection included in the Plan, in addition to
42 management activities to enhance natural communities for species and implementation of AMM1-

1 AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*, AMM18 Swainson’s Hawk
2 *and White-Tailed Kite*, and Mitigation Measure BIO-75, impacts on Cooper’s hawk and osprey would
3 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

4 **Table 12-4-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with**
5 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	2631	2631	2321	2321	NA	NA
Total Impacts CM1		2631	2631	2321	2321		
CM2–CM18	Nesting	312	507	88	121	48-82	230
Total Impacts CM2–CM18		312	507	88	121	48-82	230
TOTAL IMPACTS		33834 3	53353 8	10944	1441 42	48-82	230

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

6

7 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**
8 **Osprey**

9 Alternative 4 conservation measures would result in the combined permanent and temporary loss
10 of up to ~~677-680~~ acres (~~538 acres of permanent loss, 142 acres of temporary loss~~) of modeled
11 nesting habitat for Cooper’s hawk and osprey (Table 12-4-43). Conservation measures that would
12 result in these losses are Water Facilities and Operation (CM1) (which would involve construction of
13 conveyance facilities and transmission lines and establishment and use of ~~reusable tunnel~~
14 ~~material borrow and spoil~~ areas), Yolo Bypass Fisheries Enhancement (CM2), Tidal Natural
15 Communities Restoration (CM4), and Seasonally Inundated Floodplain Restoration (CM5). Habitat
16 enhancement and management activities (CM11), which would include ground disturbance or
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 affect Cooper’s hawk and osprey modeled habitat. Each of
20 these individual activities is described below. A summary statement of the combined impacts and
21 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 22 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 water conveyance
23 facilities would result in the combined permanent and temporary loss of up to ~~49-52~~ acres of

1 modeled Cooper's hawk and osprey habitat (Table 12-4-43). Of the ~~49-52~~ acres of modeled
 2 habitat that would be removed for the construction of the conveyance facilities, ~~26-31~~ acres
 3 would be a permanent loss and ~~23-21~~ acres would be a temporary loss of habitat. ~~Activities that~~
 4 ~~would impact modeled habitat consist of tunnel, forebay, and intake construction, permanent~~
 5 ~~and temporary access roads, construction of transmission lines, barge unloading facilities and~~
 6 ~~work areas. Most of the permanent loss of nesting habitat would occur where Intakes 1-3, 2, 3~~
 7 ~~and 5 impact the Sacramento River's east bank between Freeport and Courtland. The riparian~~
 8 ~~areas here are very small patches, some dominated by valley oak and others by nonnative trees.~~
 9 ~~Some nesting habitat would be lost due to construction of a permanent access road from the~~
 10 ~~new forebay west to a reusable tunnel material disposal area and where the realigned Highway~~
 11 ~~160 would cross Snodgrass Slough. Permanent losses would also occur along Lambert Road~~
 12 ~~where permanent utility lines would be installed and from the construction of an operable~~
 13 ~~barrier at the confluence of Old River and the San Joaquin River. Temporary losses of nesting~~
 14 ~~habitat would occur from the construction of a barge unloading facility west of the intermediate~~
 15 ~~forebay in Snodgrass Slough and where temporary work areas surround intake sites. The~~
 16 ~~riparian habitat in these areas is also composed of very small patches or stringers bordering~~
 17 ~~waterways, which are composed of valley oak and scrub vegetation. Impacts from CM1 would~~
 18 ~~occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. This-These losses~~ would have the
 19 potential to displace individuals, if present, and remove the functions and value of potentially
 20 suitable habitat. ~~Activities that would impact modeled habitat consist of tunnel, forebay, and~~
 21 ~~intake construction, temporary access roads, and construction of transmission lines. Impacts~~
 22 ~~from CM1 would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8.~~ There are no
 23 occurrences of Cooper's hawk or osprey that overlap with the construction footprint for CM1; ~~h-~~
 24 However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 25 *Disturbance of Nesting Birds*, would be available to minimize impacts on Cooper's hawk and
 26 osprey if they were to nest in the vicinity of construction activities. Refer to the Terrestrial
 27 Biology Map-~~B~~ook ~~in Appendix A of this RDEIR/SDEIS~~ for a detailed view of Alternative 4
 28 construction locations. Impacts from CM1 would occur within the first 10-~~14~~ years of Plan
 29 implementation.

- 30 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries enhancement
 31 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's
 32 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the
 33 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in
 34 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 35 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 36 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 37 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. The loss is
 38 expected to occur during the first 10 years of Alternative 4 implementation.
- 39 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently
 40 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not
 41 be actively removed but tree mortality would be expected over time as areas became tidally
 42 inundated.
- 43 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 44 seasonally inundated floodplain and riparian restoration actions would remove approximately
 45 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of

1 temporary loss). These losses would be expected after the first 10 years of Alternative 4
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 Cooper's hawk and osprey 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 Cooper's hawk and osprey habitat
8 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
9 such as removal of nonnative vegetation and road and other infrastructure maintenance, are
10 expected to have minor effects on available Cooper's hawk and osprey habitat and are expected
11 to result in overall improvements to and maintenance of habitat values over the term of the
12 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
13 and minimized by the AMMs listed below [\(AMMs are described in detail in Appendix 3.C,](#)
14 [Avoidance and Minimization Measures, of the Draft BDCP, AMM18 Swainson's Hawk and an](#)
15 [updated version of AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged](#)
16 [Material is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS\).](#)

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 [as described in](#)
20 [AMM10 Restoration of Temporarily Affected Natural Communities](#). Although the effects are
21 considered temporary, the restored riparian habitat would require 1 to several decades to
22 functionally replace habitat that has been affected and for trees to attain sufficient size and
23 structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk and White-*
24 *Tailed Kite* contains actions described below to reduce the effect of temporal loss of nesting
25 habitat, including the transplanting of mature trees.

- 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 Cooper's hawk or osprey use of the surrounding habitat.
29 Maintenance activities would include vegetation management, levee and structure repair, and
30 re-grading of roads and permanent work areas. These effects, however, would be reduced by
31 AMM1–AMM7 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 adult or fledged Cooper's hawk or osprey if they were present in the Plan
34 Area, because they would be expected to avoid contact with construction and other equipment.
35 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,
36 including equipment operation, noise and visual disturbances could affect nests or lead to their
37 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
38 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
39 be available to address these adverse effects on Cooper's hawk and osprey.

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 effect of construction would not be adverse under NEPA. Alternative 4 would remove ~~449-452~~ acres
6 (~~338-343~~ acres of permanent loss, ~~111-109~~ acres of temporary loss) of Cooper’s hawk and osprey
7 nesting habitat in the study area in the near-term. These effects would result from the construction
8 of the water conveyance facilities (CM1, ~~49-52~~ acres), and implementing other conservation
9 measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and
10 *CM5 Seasonally Inundated Floodplain Restoration*—400 acres of 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.
13 Using these ratios would indicate that ~~49-52~~ acres of nesting habitat should be restored/created and
14 ~~49-52~~ acres should be protected to compensate for the CM1 losses of modeled Cooper’s hawk and
15 osprey habitat. In addition, The near-term effects of other conservation actions would remove 400
16 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
17 protection of modeled Cooper’s hawk and osprey using the same typical NEPA and CEQA ratios.

18 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
19 valley/foothill riparian natural community ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives, of*
20 [this RDEIR/SDEIS](#)). These conservation actions are associated with CM3, and CM7 and would occur
21 in the same timeframe as the construction and early restoration losses. The majority of riparian
22 protection and restoration acres would occur in CZ 7 as part of a reserve system with extensive wide
23 bands or large patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and
24 VFRNC1.2 in [BDCP](#) Chapter 3, *Conservation Strategy, of the Draft BDCP*). Riparian restoration would
25 expand the patches of existing riparian forest in order to support nesting habitat for riparian
26 species. The Plan’s objectives would also benefit Cooper’s hawk and osprey by protecting small but
27 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
28 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
29 distribution and abundance of potential nest trees would be increased by planting and maintaining
30 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
31 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.

44 *AMM18 Swainson’s Hawk* ~~and White-Tailed Kite~~ would implement a program to plant large mature
45 trees, including transplanting trees scheduled for removal. These would be supplemented with

1 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.
 2 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.
 3 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 4 system for every tree 20 feet or taller anticipated to be removed by construction during the near-
 5 term period. A variety of native tree species would be planted to provide trees with differing growth
 6 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps
 7 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or
 8 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement
 9 trees that were incorporated into the riparian restoration would not be clustered in a single region
 10 of the study area, but would be distributed throughout the conserved 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 18 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 19 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures](#). Cooper's hawk and osprey
 20 are not species that are covered under the BDCP. For the BDCP to avoid an adverse effect on
 21 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
 22 active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
 23 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse
 24 effect.

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 4 as a whole would result in the permanent loss of and temporary effects on
 28 [677-680](#) 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 ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives, of this*
 33 [RDEIR/SDEIS](#)). The majority of riparian protection and restoration acres would occur in CZ 7 as part
 34 of a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
 35 community (Objectives VFRNC1.1 and VFRNC1.2 in [BDCP](#) Chapter 3, *Conservation Strategy, of the*
 36 [Draft BDCP](#)). Riparian restoration would expand the patches of existing riparian forest in order to
 37 support nesting habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk
 38 and osprey by protecting small but essential habitats that occur within cultivated lands, such as tree
 39 rows along field borders or roads, and small clusters of trees in farmyards or rural
 40 residences (Objective CLNC1.3). In addition, the distribution and abundance of potential 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).

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 45 *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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
5 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
6 *[RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures](#). Cooper's hawk and osprey*
7 *are not species that are covered under the BDCP. For the BDCP to avoid an adverse effect on*
8 *individuals, preconstruction surveys for noncovered avian species would be required to ensure that*
9 *active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting**
10 **Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse*
11 *effect.*

12 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential direct mortality of these
13 special-status species under Alternative 4 would represent an adverse effect in the absence of other
14 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7,
15 guided by biological goals and objectives and by AMM1–AMM7, [AMM10](#), and *AMM18 Swainson's*
16 *Hawk and White-Tailed Kite*, which would be in place [during all project activities throughout the](#)
17 [construction period](#), the effects of habitat loss on Cooper's hawk and osprey under Alternative 4
18 would not be adverse. Cooper's hawk and osprey are not covered species under the BDCP. For the
19 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
20 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75
21 would be available to address this adverse effect.

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 effect of construction would ~~not be adverse-less-than-significant~~ under [NEPA/CEQA](#). Alternative 4
28 would remove ~~449-452~~ acres (~~338-343~~ acres of permanent loss, ~~111-109~~ acres of temporary loss) of
29 Cooper's hawk and osprey nesting habitat in the study area in the near-term. These effects would
30 result from the construction of the water conveyance facilities (CM1, ~~49-52~~ acres), and
31 implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal*
32 *Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration—400 acres*
33 *of habitat*).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
35 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
36 Using these ratios would indicate that ~~49-52~~ acres of nesting habitat should be restored/created and
37 ~~49-52~~ acres should be protected to mitigate the CM1 losses of modeled Cooper's hawk and osprey
38 habitat. In addition, The near-term effects of other conservation actions would remove 400 acres of
39 modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
40 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios. The
41 BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
42 valley/foothill riparian natural community ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives, of*
43 [this RDEIR/SDEIS](#)). These conservation actions are associated with CM3, and CM7 and would occur
44 in the same timeframe as the construction and early restoration losses. The majority of riparian

1 protection and restoration acres would occur in CZ 7 as part of a reserve system with extensive wide
2 bands or large patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and
3 VFRNC1.2 in ~~BDCP~~-Chapter 3, *Conservation Strategy*, ~~of the Draft BDCP~~). Riparian restoration would
4 expand the patches of existing riparian forest in order to support nesting habitat for riparian
5 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but
6 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
7 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
8 distribution and abundance of potential nest trees would be increased by planting and maintaining
9 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
10 per 10 acres (Objective SWHA2.1).

11 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
12 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
13 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
14 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
15 would require one to several decades to functionally replace habitat that has been affected and for
16 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
17 between the removal and restoration of nesting habitat could have a substantial impact on nesting
18 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
19 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
20 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
21 habitat would further reduce this limited resource and could reduce or restrict the number of active
22 nests within the study area until restored riparian habitat is sufficiently developed.

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 would avoid or
28 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are
29 described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
30 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
31 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

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 five trees (5-gallon container size) would be planted within the BDCP reserve
37 system for every tree 20 feet or taller anticipated to be removed by construction during the near-
38 term period. A variety of native tree species would be planted to provide trees with differing growth
39 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps
40 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or
41 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement
42 trees that were incorporated into the riparian restoration would not be clustered in a single region
43 of the study area, but would be distributed throughout the conserved lands.

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. In the absence of
6 other conservation actions, the effects on Cooper's hawk and osprey nesting habitat would
7 represent an adverse effect as a result of habitat modification and potential for direct mortality of
8 special-status species. Cooper's hawk and osprey are not species that are covered under the BDCP.
9 For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered
10 avian species would be required to ensure that active nests are detected and avoided.
11 Implementation of Mitigation Measure BIO-75 would reduce the potential impact on nesting
12 Cooper's hawk and osprey to a less-than-significant level. Considering Alternative 4's protection
13 and restoration provisions, which would provide acreages of new or enhanced habitat in amounts
14 greater than necessary to compensate for the time lag of restoring riparian habitats lost to
15 construction and restoration activities, and with implementation of AMM1-AMM7, AMM10, AMM18
16 Swainson's Hawk, and Mitigation Measure BIO-75, the loss of habitat or direct mortality through
17 implementation of Alternative 4 would not result in a substantial adverse effect through habitat
18 modifications and would not substantially reduce the number or restrict the range of either species.
19 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
20 significant impact on Cooper's hawk and osprey.

21 **Late Long-Term Timeframe**

22 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
23 and osprey. Alternative 4 as a whole would result in the permanent loss of and temporary effects on
24 677-680 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

25 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
26 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
27 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
28 riparian natural community (see Table 3-4 in Chapter 3, *Description of Alternatives*, of this
29 RDEIR/SDEIS). The majority of riparian protection and restoration acres would occur in CZ 7 as part
30 of a 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*, of the
32 Draft BDCP). Riparian restoration would expand the patches of existing riparian forest in order to
33 support nesting habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk
34 and osprey by protecting small but essential habitats that occur within cultivated lands, such as tree
35 rows along field borders or roads, and small clusters of trees in farmyards or rural
36 residences(Objective CLNC1.3). In addition, the distribution and abundance of potential nest trees
37 would be increased by planting and maintaining native trees along roadsides and field borders
38 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1).

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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an

1 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
2 RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures. Cooper's hawk and osprey
3 are not species that are covered under the BDCP. For the BDCP to have a less-than-significant impact
4 on individuals, preconstruction surveys for noncovered avian species would be required to ensure
5 that active nests are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct*
6 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
7 impact to a less-than-significant level.

8 Considering Alternative 4's protection and restoration provisions, which would provide acreages of
9 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
10 restoring riparian habitats lost to construction and restoration activities, and with implementation
11 of AMM1-AMM7, AMM10, AMM18 Swainson's Hawk and White-Tailed kite, and Mitigation Measure
12 BIO-75, the loss of habitat or direct mortality through implementation of Alternative 4 would not
13 result in a substantial adverse effect through habitat modifications and would not substantially
14 reduce the number or restrict the range of either species. Therefore, the loss of habitat or potential
15 mortality under this alternative would have a less-than-significant impact on Cooper's hawk and
16 osprey.

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-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**
21 **Transmission Facilities**

22 New transmission lines would increase the risk for bird-power line strikes, which could result in
23 injury or mortality of Cooper's hawk and osprey. However, the flight behavior of these species, their
24 keen vision, and high maneuverability substantially reduce the risk of powerline collisions. The
25 existing network of transmission lines in the project area currently poses the same small risk for
26 Cooper's hawk and osprey, and any incremental risk associated with the new power line corridors
27 would also be expected to be low. Marking transmission lines with flight diverters that make the
28 lines more visible to birds has been shown to dramatically reduce the incidence of bird mortality
29 (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could
30 reduce avian mortality by 60%. With the implementation of AMM20 Greater Sandhill Crane, all new
31 transmission lines would be fitted with flight diverters, which would further reduce any risk of
32 collision with lines.

33 ~~New transmission lines would increase the risk for bird-power line strikes, which could result in~~
34 ~~injury or mortality of Cooper's hawk and osprey. The existing network of transmission lines in the~~
35 ~~Plan Area currently poses the same small risk for Cooper's hawk and osprey, and any incremental~~
36 ~~risk associated with the new power line corridors would also be expected to be low. AMM20 Greater~~
37 ~~Sandhill Crane, which would install flight diverters on new and selected existing transmission lines,~~
38 ~~would further reduce any potential effects.~~

39 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
40 adverse effect because the risk of bird strike is considered to be minimal based on the general
41 maneuverability and keen eyesight of Cooper's hawk and osprey. In addition, AMM20 Greater
42 Sandhill Crane contains the commitment to place bird strike diverters on all new powerlines, which
43 would further reduce any risk of mortality from bird strike for Cooper's hawk and osprey from the

1 ~~project. Therefore, the construction and operation of new transmission lines under Alternative 4~~
2 ~~would not result in an adverse effect on Cooper's hawk and osprey. New transmission lines would~~
3 ~~increase the risk for bird-power line strikes, which could result in injury or mortality of Cooper's~~
4 ~~hawk and osprey. With the implementation of AMM20 Greater Sandhill Crane, which would install~~
5 ~~flight diverters on new and selected existing transmission lines, there would not be an adverse~~
6 ~~effect on Cooper's hawk and osprey.~~

7 **CEQA Conclusion:** ~~The construction and presence of new transmission lines would not represent an~~
8 ~~adverse effect because the risk of bird strike is considered to be minimal based on the general~~
9 ~~maneuverability and keen eyesight of Cooper's hawk and osprey. In addition, AMM20 Greater~~
10 ~~Sandhill Crane contains the commitment to place bird strike diverters on all new powerlines, which~~
11 ~~would further reduce any risk of mortality from bird strike for Cooper's hawk and osprey from the~~
12 ~~project. Therefore, the construction and operation of new transmission lines under Alternative 4~~
13 ~~would result in a less-than-significant impact on Cooper's hawk and osprey. New transmission lines~~
14 ~~would increase the risk for bird-power line strikes, which could result in injury or mortality of~~
15 ~~Cooper's hawk and osprey. AMM20 Greater Sandhill Crane, which would install flight diverters on~~
16 ~~new and selected existing transmission lines, would minimize this risk would reduce the impact of~~
17 ~~new transmission lines on Cooper's hawk and osprey to a less-than-significant level.~~

18 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

19 **Indirect construction- and operation-related effects:** Construction noise above background noise
20 levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities
21 (Draft BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
22 *Conveyance Facility on Sandhill Crane*, Table 4 in Appendix D, Substantive BDCP Revisions, of this
23 RDEIR/SEIS), although there are no available data to determine the extent to which these noise
24 levels could affect Cooper's hawk or osprey. If Cooper's hawk or osprey were to nest in or adjacent
25 to work areas, construction and subsequent maintenance-related noise and visual disturbances
26 could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable
27 nesting habitat for these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
28 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of
29 construction-related activities on survival and productivity of nesting Cooper's hawk and osprey.
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 Cooper's hawk and osprey in
32 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
33 suitable habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*
34 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
35 spills and ensure that measures are in place to prevent runoff from the construction area and
36 negative effects of dust on active nests.

37 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
38 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under
39 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration
40 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to
41 estimate fish-tissue concentrations under these future operational conditions (evaluated starting
42 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues
43 due to ESO were insignificant (see Draft BDCP Appendix 5.D, Contaminants, Tables 5D.4-3, 5D.4-4,
44 and 5D.4-5).

1 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
2 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
3 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
4 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
5 could increase bioavailability of mercury (see ~~BDCP~~ Chapter 3, *Conservation Strategy, of the Draft*
6 ~~BDCP~~ for details of restoration). Species sensitivity to methylmercury differs widely and there is a
7 large amount of uncertainty with respect to species-specific effects. Increased methylmercury
8 associated with natural community and floodplain restoration could indirectly affect cooper's hawk
9 and osprey, via uptake in lower trophic levels (as described in ~~the BDCP~~, Appendix 5.D, *Contaminants,*
10 ~~of the Draft BDCP~~).

11 The potential mobilization or creation of methylmercury within the Plan Area varies with site-
12 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
13 *Management* contains provisions for Project-specific Mercury Management Plans. Site-specific
14 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
15 adaptive management as described in CM12 would be available to address the uncertainty of
16 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

17 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
18 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,
19 operation and maintenance of the water conveyance facilities, including the transmission facilities,
20 could result in ongoing but periodic postconstruction disturbances that could adversely affect
21 Cooper's hawk and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, in addition to AMM1-
23 AMM7, would be available to address this adverse effect. The implementation of tidal natural
24 communities restoration or floodplain restoration could result in increased exposure of Cooper's
25 hawk or osprey to methylmercury, through the ingestion of fish or small mammals in tidally
26 restored areas. However, it is currently unknown what concentrations of methylmercury are
27 harmful to these species and the potential for increased exposure varies substantially within the
28 study area. Site-specific restoration plans that address the creation and mobilization of mercury, as
29 well as monitoring and adaptive management as described in CM12 would better inform potential
30 impacts and address the uncertainty of methylmercury levels in restored tidal marsh in the study
31 area on cooper's hawk and osprey. The site-specific planning phase of marsh restoration would be
32 the appropriate place to assess the potential for risk of methylmercury exposure for Cooper's hawk
33 and osprey, once site specific sampling and other information could be developed.

34 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
35 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.
36 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
37 facilities, could result in ongoing but periodic postconstruction disturbances that could affect
38 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,
39 increased dust and sedimentation, and operations and maintenance of the water conveyance
40 facilities under Alternative 4 would have a less-than-significant impact on Cooper's hawk and osprey
41 with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
42 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1-AMM7. The implementation of tidal
43 natural communities restoration or floodplain restoration could result in increased exposure of
44 Cooper's hawk or osprey to methylmercury through the ingestion of fish or small mammals in
45 restored tidal areas. However, it is currently unknown what concentrations of methylmercury are
46 harmful to these species. Site-specific restoration plans that address the creation and mobilization of

1 mercury, as well as monitoring and adaptive management as described in CM12, would address the
2 uncertainty of methylmercury levels in restored tidal marsh in the study area and better inform
3 potential impacts on Cooper's hawk and osprey.

4 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
5 **Disturbance of Nesting Birds**

6 See Mitigation Measure BIO-75 under Impact BIO-75.

7 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**
8 **as a Result of Implementation of Conservation Components**

9 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
10 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey
11 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on
12 breeding habitat because trees in which nest sites are situated already withstand floods, the
13 increase in inundation frequency and duration is expected to remain within the range of tolerance of
14 riparian trees, and nest sites are located above floodwaters.

15 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
16 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of
17 seasonal inundation in existing riparian natural communities is likely to be beneficial for these
18 species, because, historically, flooding was the main natural disturbance regulating ecological
19 processes in riparian areas, and flooding promotes the germination and establishment of many
20 native riparian plants.

21 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
22 sites because trees in which nest sites are situated already withstand floods, the increase in
23 inundation frequency and duration is expected to remain within the range of tolerance of riparian
24 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation
25 from CM2 and CM5 would not have an adverse effect on Cooper's hawk and osprey.

26 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
27 nest sites because trees in which nest sites are situated already withstand floods, the increase in
28 inundation frequency and duration is expected to remain within the range of tolerance of riparian
29 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation
30 from CM2 and CM5 would have a less-than-significant impact on Cooper's hawk and osprey.

31 **Golden Eagle and Ferruginous Hawk**

32 This section describes the effects of Alternative 4, including water conveyance facilities construction
33 and implementation of other conservation components, on golden eagle and ferruginous hawk.
34 Modeled foraging habitat for these species consists of grassland, alkali seasonal wetland, vernal pool
35 complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study area.

36 Construction and restoration associated with Alternative 4 conservation measures would result in
37 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging
38 habitat as indicated in Table 12-4-44. Full implementation of Alternative 4 would include the
39 following conservation actions over the term of the BDCP that would also benefit golden eagles or
40 ferruginous hawk ([BDCP-see](#) Chapter 3, Section 3.3, *Biological Goals and Objectives, of the Draft*
41 [BDCP](#)).

- 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 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
8 VPNC2.5, and GNC2.4, associated with CM11).
- 9 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
10 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 11 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
12 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value
13 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

14 As explained below, with the restoration or protection of these amounts of habitat, in addition to
15 management activities to enhance natural communities for species and implementation of AMM1–
16 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and
17 would be less than significant for CEQA purposes.

18 **Table 12-4-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**
19 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	1,9699 <u>67</u>	1,9699 <u>67</u>	63350 <u>3</u>	6335 <u>03</u>	NA	NA
Total Impacts CM1		1,9699 <u>67</u>	1,9699 <u>67</u>	63350 <u>3</u>	6335 <u>03</u>		
CM2–CM18	Foraging	5,450	26,198	376	893	1,158-3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158-3,650	3,823
TOTAL IMPACTS		7,4194 <u>17</u>	28,167 <u>165</u>	1,009 <u>879</u>	1,526 <u>396</u>	1,158-3,650	3,823

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

1 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**
2 **Ferruginous Hawk**

3 Alternative 4 conservation measures would result in the combined permanent and temporary loss
4 of up to ~~29,693-561~~ acres of modeled foraging habitat for golden eagle and ferruginous hawk (28,167
5 ~~165~~ acres of permanent loss and 1,526-396 of temporary loss, Table 12-4-44). Conservation
6 measures that would result in these losses are conveyance facilities and transmission line
7 construction, and establishment and use of ~~reusable tunnel material borrow and spoil~~ areas (CM1),
8 Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration
9 (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration
10 (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The
11 majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and
12 management activities (CM11), which include ground disturbance or removal of nonnative
13 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
14 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
15 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
16 golden eagle foraging habitat. Each of these individual activities is described below. A summary
17 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual
18 conservation measure discussions.

- 19 • *CM1 Water Facilities ~~Construction and Operation~~*: Construction of Alternative 4 conveyance
20 facilities would result in the combined permanent and temporary loss of up to ~~2,602,470~~ acres
21 of modeled golden eagle and ferruginous hawk habitat (1,969-967 acres of permanent loss, ~~633~~
22 ~~503~~ acres of temporary loss). Impacts would occur from the construction of ~~intakes~~ ~~Intakes~~ 2, 3,
23 and 5 and associated temporary work areas and access roads in CZ 4 between Clarksburg and
24 Courtland; ~~the rerouting of Highway 160; construction of the intermediate forebay; and from a~~
25 ~~reusable tunnel material storage area on Bouldin Island~~. The construction of the permanent and
26 temporary transmission line corridors through CZs 4-6 and 9 would also remove suitable
27 foraging habitat for the species. Approximately ~~796 acres of impact would be from the~~
28 ~~placement of reusable tunnel material area west of the Clifton Court Forebay in CZ 8. In addition,~~
29 ~~permanent habitat loss would 685 acres of impact would be occur~~ from the ~~construction of the~~
30 new forebay ~~constructed~~ south of the ~~existing~~ Clifton court Forebay in CZ 8. Some of the
31 grassland habitat lost at the sites of new canals south of Clifton Court Forebay is composed of
32 larger stands of ruderal and herbaceous vegetation and California annual grassland, which is
33 also suitable foraging habitat for the species. There are no occurrences of golden eagle or
34 ferruginous hawk that intersect with the CM1 footprint. Refer to the Terrestrial Biology Map
35 ~~Book~~ ~~in Appendix A of this RDEIR/SDEIS~~ for a detailed view of Alternative 4 construction
36 locations. Impacts from CM1 would occur within the first 10-~~14~~ years of Plan implementation.
- 37 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
38 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
39 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of
40 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
41 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
42 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
43 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
44 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
45 years of Alternative 4 implementation.

- 1 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
2 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and
3 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs
4 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on
5 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
6 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
7 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in
8 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex
9 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of
10 Suisun Marsh.
- 11 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
12 seasonally inundated floodplain would permanently and temporarily remove approximately
13 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,
14 517 temporary). These losses would be expected after the first 10 years of Alternative 4
15 implementation along the San Joaquin River and other major waterways in CZ 7.
- 16 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland
17 Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
18 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
19 would be restored after the construction periods. Grassland restoration would be implemented
20 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk
21 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 22 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
23 removal of 705 acres of golden eagle and ferruginous hawk foraging 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 restored or protected
26 habitats could result in localized ground disturbances that could temporarily remove small
27 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,
28 such as removal of nonnative vegetation and road and other infrastructure maintenance
29 activities, would be expected to have minor adverse effects on available habitat for these
30 species. CM11 would also include the construction of recreational-related facilities including
31 trails, interpretive signs, and picnic tables ([BDCP-see Chapter 4, Covered Activities and Associated
32 Federal Actions, of the Draft BDCP](#)). The construction of trailhead facilities, signs, staging areas,
33 picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and where
34 possible. However, approximately 50 acres of grassland habitat would be lost from the
35 construction of trails and facilities.
- 36 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
37 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and
38 longfin smelt conservation hatchery in CZ 1.
- 39 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
40 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
41 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.
42 Maintenance activities would include vegetation management, levee and structure repair, and
43 re-grading of roads and permanent work areas. These effects, however, would be reduced by
44 AMM1–AMM7 and conservation actions as described below.

- 1 • Injury and Direct Mortality: Construction would not be expected to result in direct mortality of
2 golden eagle and ferruginous hawk because foraging individuals would be expected to
3 temporarily avoid the increased noise and activity associated with construction areas.

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 (CM1) is being evaluated at the project level,
9 the near-term BDCP conservation strategy has been evaluated to determine whether it would
10 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
11 effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,428-296
12 acres (7,419-417 permanent, 1,009,879 temporary) of modeled golden eagle and ferruginous hawk
13 foraging habitat in the study area in the near-term. These effects would result from the construction
14 of the water conveyance facilities (CM1, 2,602-470 acres), and implementing other conservation
15 measures (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7
16 Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal
17 Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and
18 Management and CM18 Conservation Hatcheries—5,826 acres).

19 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
20 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,2044,940 acres should
21 be protected to compensate for the CM1 losses of 2,602-470 acres of golden eagle and ferruginous
22 hawk foraging habitat. The near-term effects of other conservation actions would remove 5,826
23 acres of modeled habitat, and therefore require 11,652 acres of protection of golden eagle and
24 ferruginous hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

25 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
26 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
27 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
28 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are
29 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
30 early restoration losses thereby avoiding adverse effects of habitat loss on golden eagle and
31 ferruginous hawk foraging in the study area. Grassland restoration and protection would occur in
32 CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11
33 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1
34 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and
35 vernal pool natural communities which would expand golden eagle and ferruginous hawk foraging
36 habitat and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
37 *Communities Enhancement and Management*, insect and mammal prey populations would be
38 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
39 ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural
40 communities by encouraging ground squirrel occupancy and expansion through the creation of
41 berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
42 poisoning).

43 Cultivated lands that provide habitat for covered and other native wildlife species would provide
44 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk

1 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time
2 period would be in alfalfa and pasture crop types (very high- and high-value crop types for
3 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.
4 This biological objective provides an estimate for the high proportion of cultivated lands protected
5 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

6 The acres of restoration and protection contained in the near-term Plan goals and the additional
7 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
8 level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate the near-term effects
9 of the other conservation measures with the consideration that some portion of the 15,400 acres of
10 cultivated lands protected in the near-term timeframe would be managed in suitable crop types to
11 compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-113, *Compensate for the*
12 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat* would be available to
13 address the adverse effect of habitat loss in the near-term.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
21 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
22 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

23 **Late Long-Term Timeframe**

24 Alternative 4 as a whole would result in the permanent loss of and temporary effects on
25 [29,692,59,561](#) acres of modeled golden eagle and ferruginous hawk foraging habitat during the term
26 of the Plan. The locations of these losses are described above in the analyses of individual
27 conservation measures. The Plan includes conservation commitments through *CM3 Natural*
28 *Communities Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9*
29 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore
30 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150
31 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide
32 suitable habitat for native wildlife species ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives, of*
33 [this RDEIR/SDEIS](#)). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
34 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with
35 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
36 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
37 communities which would expand foraging habitat for golden eagle and ferruginous hawk and
38 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
39 *Enhancement and Management*, insect and small mammal prey populations would be increased on
40 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
41 VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural communities by
42 encouraging ground squirrel occupancy and expansion through the creation of berms, mounds,
43 edges, and through the prohibition of ground squirrel control programs (i.e., poisoning). Cultivated
44 lands that provide habitat for covered and other native wildlife species would provide
45 approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk (Objective

1 CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture
2 crop types (very high- and high-value crop types for Swainson's hawk (Objective SH1.2) which are
3 also suitable for golden eagle and ferruginous hawk.

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 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
11 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
12 *[RDEIR/SDEIS. BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

13 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential mortality of these
14 special-status species under Alternative 4 would represent an adverse effect in the absence of other
15 conservation actions. However, with habitat protection and restoration associated with CM3, CM8,
16 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in
17 place ~~during all project activities throughout the construction period~~, and with implementation of
18 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*
19 *Hawk Foraging Habitat*, the effects of habitat loss and potential for direct mortality on golden eagle
20 and ferruginous hawk under Alternative 4 would not be adverse.

21 **CEQA Conclusion:**

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 be less than significant under CEQA. Alternative 4 would remove ~~8,428~~
27 ~~296~~ acres (7,419-417 permanent, 1,009-879 temporary) of modeled golden eagle and ferruginous
28 hawk foraging habitat in the study area in the near-term. These effects would result from the
29 construction of the water conveyance facilities (CM1, 2,602-470 acres), and implementing other
30 conservation measures (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities
31 Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community
32 Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural
33 Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).

34 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
35 would be 2:1 for protection of habitat. Using this ratio would indicate that ~~5,204,940~~ acres should
36 be protected to mitigate the CM1 losses of 2,602-470 acres of golden eagle and ferruginous hawk
37 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of
38 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
39 hawk habitat using the same typical NEPA and CEQA ratio (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 ([see](#) Table
43 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are

1 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
2 early restoration losses thereby avoiding significant impacts of habitat loss on golden eagle and
3 ferruginous hawk foraging in the study area. Grassland restoration and protection would occur in
4 CZs 1, 2, 4, 5, 7, 8, and 11. (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11
5 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1
6 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and
7 vernal pool natural communities which would expand golden eagle and ferruginous hawk foraging
8 habitat and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
9 *Communities Enhancement and Management*, insect and mammal prey populations would be
10 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
11 ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural
12 communities by encouraging ground squirrel occupancy and expansion through the creation of
13 berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
14 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would
15 provide approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous
16 hawk (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term
17 time period would be in alfalfa and pasture crop types (very high- and high-value crop types for
18 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.
19 This biological objective provides an estimate for the high proportion of cultivated lands protected
20 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

21 These Plan objectives represent performance standards for considering the effectiveness of
22 conservation actions.

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 would avoid or
28 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are
29 described in detail in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
30 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
31 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

32 In the absence of other conservation actions, the effects on golden eagle and ferruginous hawk
33 foraging habitat would represent an adverse effect as a result of habitat modification and potential
34 for direct mortality of special-status species.† However, the he acres of restoration and protection
35 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
36 typical mitigation that would be applied to the project-level effects of CM1 on golden eagle and
37 ferruginous hawk, as well as mitigate the near-term effects of the other conservation measures with
38 the consideration that some portion of the 15,400 acres of cultivated lands protected in the near-
39 term timeframe would be managed in suitable crop types to compensate for the loss of habitat at a
40 ratio of 2:1. The implementation of the conservation actions described above, in addition to AMMs2-
41 AMM7, and Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and*
42 *Feruginous Hawk Foraging Habitat* would reduce the impact of habitat loss in the near-term to less
43 than significant.

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 4 as a whole would result in the permanent loss of and temporary effects on 29,692
8 561 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the
9 Plan. 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 Community Restoration*, and *CM9 Vernal Pool and*
12 *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 (see Table 3-4 in Chapter 3, *Description of Alternatives, of this*
16 *RDEIR/SDEIS*). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
17 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with
18 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
19 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
20 communities which would expand foraging habitat for golden eagle and ferruginous hawk and
21 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
22 *Enhancement and Management*, insect and small mammal prey populations would be increased on
23 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
24 VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural communities by
25 encouraging ground squirrel occupancy and expansion through the creation of berms, mounds,
26 edges, and through the prohibition of ground squirrel control programs (i.e., poisoning). Cultivated
27 lands that provide habitat for covered and other native wildlife species would provide
28 approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk (Objective
29 CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture
30 crop types. These are very high- and high-value crop types for Swainson's hawk (Objective SH1.2)
31 which are also suitable for golden eagle and ferruginous hawk.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
39 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
40 [RDEIR/SDEIS](#) ~~BDCP Appendix 3.C, Avoidance and Minimization Measures.~~

41 In the absence of other conservation actions, the effects on golden eagle and ferruginous hawk
42 foraging habitat would represent an adverse effect as a result of habitat modification and potential
43 for direct mortality of special-status species; however, Considering Alternative 4's protection and
44 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
45 suitable to compensate for habitats lost to construction and restoration activities, and with the

1 implementation of AMM1–AMM7, and Mitigation Measure BIO-113, *Compensate for the Near-Term*
2 *Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the loss of habitat or direct mortality
3 through implementation of Alternative 4 would not result in a substantial adverse effect through
4 habitat modifications and would not substantially reduce the number or restrict the range of either
5 species. Therefore, the loss of habitat or potential mortality under this alternative would have a less-
6 than-significant impact on golden eagle and ferruginous 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 Golden eagle and ferruginous hawk would be at low risk of bird strike mortality from the
17 construction of new transmission lines based on their maneuverability, their keen eyesight, their
18 lack of flocking behavior, and other factors assessed in the bird strike vulnerability analysis (BDCP
19 Attachment 5.J-2, Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission
20 Lines). Marking transmission lines with flight diverters that make the lines more visible to birds has
21 been shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)
22 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. With the
23 implementation of AMM20 Greater Sandhill Crane, all new transmission lines would be fitted with
24 flight diverters which would substantially reduce any potential for powerline collisions.

25 ~~New transmission lines would increase the risk that golden eagles and ferruginous hawks could be~~
26 ~~subject to power line strikes, which could result in injury or mortality of these species. Golden eagle~~
27 ~~and ferruginous hawk would be at low risk of bird strike mortality based on factors assessed in the~~
28 ~~bird strike vulnerability analysis (BDCP Attachment 5.J-2, Memorandum: Analysis of Potential Bird~~
29 ~~Collisions at Proposed BDCP Transmission Lines). Factors analyzed include the height of the new~~
30 ~~transmission lines and the flight behavior of species. The existing network of transmission lines in~~
31 ~~the Plan Area currently poses the same small risk for golden eagle and ferruginous hawk, and any~~
32 ~~incremental risk associated with the new power line corridors would also be expected to be low.~~
33 ~~AMM20 Greater Sandhill Crane, would further reduce any potential effects.~~

34 **NEPA Effects:** Golden eagle and ferruginous hawk are already at a low risk of bird strike mortality
35 based on their general maneuverability, keen eyesight and lack of flocking behavior. All new
36 transmission lines constructed as a result of the project would be fitted with bird diverters, which
37 have been shown to reduce avian mortality by 60%. By implementing AMM20 Greater Sandhill
38 Crane, the construction and operation of transmission lines would not result in an adverse effect on
39 golden eagle or ferruginous hawk.~~New transmission lines would minimally increase the risk for~~
40 ~~golden eagle and ferruginous hawk power line strikes. With the implementation of AMM20 Greater~~
41 ~~Sandhill Crane, the potential effect of the construction of new transmission lines on golden eagle and~~
42 ~~ferruginous hawk would not be adverse.~~

1 **CEQA Conclusion:** Golden eagle and ferruginous hawk are already at a low risk of bird strike
2 mortality based on their general maneuverability, keen eyesight and lack of flocking behavior. All
3 new transmission lines constructed as a result of the project would be fitted with bird diverters,
4 which have been shown to reduce avian mortality by 60%. By implementing AMM20 Greater
5 Sandhill Crane, the construction and operation of transmission lines would not result in an adverse
6 effect on golden eagle or ferruginous hawk. ~~New transmission lines would minimally increase the~~
7 ~~risk for golden eagle and ferruginous hawk power line strikes. AMM20 Greater Sandhill Crane would~~
8 ~~reduce the potential impact of the construction of new transmission lines on golden eagle and~~
9 ~~ferruginous hawk to a less-than-significant level.~~

10 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**
11 **Hawk**

12 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
13 foraging, and reduce the functions of suitable foraging habitat for golden eagle and ferruginous
14 hawk. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to
15 5,250 feet from the edge of construction activities (~~Draft BDCP~~ Appendix 5.J, Attachment 5J.D,
16 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4 [in](#)
17 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS](#)), although there are no available data to
18 determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.
19 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
20 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
21 equipment during water conveyance facilities construction could cause the accidental release of
22 petroleum or other contaminants that could affect these species or their prey in the surrounding
23 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
24 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
25 or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a
26 negative effect on the species. However, AMM1–AMM7 would also ensure that measures would be in
27 place to prevent runoff from the construction area and the negative effects of dust on wildlife
28 adjacent to work areas.

29 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Plan
30 implementation could have adverse effects on these species through the modification of habitat.
31 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 4
32 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

33 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Plan
34 implementation could have a significant impact on the species from modification of habitat. With the
35 incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 4
36 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

37 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk**
38 **Habitat as a Result of 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 golden eagle and ferruginous hawk foraging habitat (Table 12-4-44). Based
42 on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration*

1 could result in the periodic inundation of up to approximately 3,823 acres of modeled habitat (Table
2 12-4-44).

3 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and
4 increased frequency and duration of inundation of grassland habitats may affect prey populations
5 that have insufficient time to recover following inundation events. However, periodically inundated
6 habitat would not be expected to have an adverse effect on local or migratory golden eagles or the
7 wintering ferruginous hawk populations in the study area.

8 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on
9 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In
10 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of
11 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on
12 the wintering golden eagle or ferruginous hawk populations in the study area.

13 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation
14 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging
15 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823
16 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-
17 significant impact on the golden eagle and ferruginous hawk populations in the study area.

18 **Cormorants, Herons and Egrets**

19 This section describes the effects of Alternative 4, including water conveyance facilities construction
20 and implementation of other conservation components, on double-crested cormorant, great blue
21 heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding habitat for these
22 species consists of valley/foothill riparian forest.

23 Construction and restoration associated with Alternative 4 conservation measures would result in
24 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated
25 in Table 12-4-45. The majority of the losses would take place over an extended period of time as
26 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would
27 be initiated in the same timeframe as the losses, it could take one or more decades for restored
28 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of
29 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk* ~~and~~
30 *White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full
31 implementation of Alternative 4 would include the following conservation actions over the term of
32 the BDCP which would also benefit cormorants, herons, and egrets (~~BDCP-see~~ Chapter 3, Section 3.3,
33 *Biological Goals and Objectives*, ~~of the Draft BDCP~~).

- 34 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
35 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
36 associated with CM7).
- 37 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
38 10 (Objective VFRNC1.2, associated with CM3).
- 39 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
40 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
41 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
42 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 2 management activities to enhance natural communities for species and implementation of AMM1–
 3 AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM18 Swainson’s Hawk*
 4 *and White-Tailed Kite*, and Mitigation Measure BIO-75, impacts on cormorants, herons, and egrets
 5 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-4-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**
 7 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting (Rookeries)	3442	3442	3031	3031	NA	NA
Total Impacts CM1		3442	3442	3031	3031		
CM2–CM18	Nesting (Rookeries)	387	684	88	123	51–92	266
Total Impacts CM2–CM18		387	684	88	123	51–92	266
TOTAL IMPACTS		4214 29	72618	11811 9	1531 54	51–92	266

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

8

9 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**
 10 **Cormorants, Herons and Egrets**

11 Alternative 4 conservation measures would result in the combined permanent and temporary loss
 12 of up to ~~871-880~~ acres of modeled nesting habitat (~~718-726~~ acres of permanent loss, ~~153-154~~ acres
 13 of temporary loss) for double-crested cormorant, great blue heron, great egret, snowy egret, and
 14 black-crowned night heron (Table 12-4-45). Conservation measures that would result in these
 15 losses are conveyance facilities and transmission line construction, and establishment and use of
 16 ~~reusable tunnel material borrow and spoil~~ areas (CM1), Fremont Weir/Yolo Bypass fisheries
 17 improvements (CM2), tidal natural communities restoration (CM4), and seasonally inundated
 18 floodplain restoration (CM5). Habitat enhancement and management activities (CM11) which
 19 include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat
 20 effects. In addition, maintenance activities associated with the long-term operation of the water
 21 conveyance facilities and other BDCP physical facilities could degrade or eliminate cormorant,
 22 heron, and egret modeled habitat. Each of these individual activities is described below. A summary

1 statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the individual
2 conservation measure discussions.

- 3 • *CM1 Water Facilities ~~Construction and Operation~~*: Construction of Alternative 4 water conveyance
4 facilities would result in the combined permanent and temporary loss of up to ~~64-73~~ acres of
5 modeled nesting habitat for cormorants, herons, and egrets. (Table 12-4-45). Of the ~~64-73~~ acres
6 of modeled habitat that would be removed for the construction of the conveyance facilities, ~~34~~
7 ~~42~~ acres would be a permanent loss and ~~30-31~~ acres would be a temporary loss of habitat. ~~This~~
8 ~~loss would have the potential to displace individuals, if present, and remove the functions and~~
9 ~~value of potentially suitable habitat.~~ Activities that would impact modeled nesting habitat
10 consist of tunnel, forebay, and intake construction, ~~permanent and~~ temporary access roads, ~~and~~
11 construction of transmission lines, ~~barge unloading facilities, and temporary work areas.~~ Most of
12 the permanent loss of nesting habitat would occur where Intakes 2, 3, and 5 impact the
13 Sacramento River's east bank between Freeport and Courtland. The riparian areas here are very
14 small patches, some dominated by valley oak and others by nonnative trees. ~~Some nesting~~
15 ~~habitat would be lost due to construction of a permanent access road from the new forebay west~~
16 ~~to a reusable tunnel material disposal area and where the realigned Highway 160 would cross~~
17 ~~Snodgrass Slough. Permanent losses would also occur along Lambert Road where permanent~~
18 ~~utility lines would be installed and from the construction of an operable barrier at the~~
19 ~~confluence of Old River and the San Joaquin River. Temporary losses of nesting habitat would~~
20 ~~occur from the construction of a barge unloading facility west of the intermediate forebay in~~
21 ~~Snodgrass Slough and where temporary work areas surround intake sites. The riparian habitat~~
22 ~~in these areas is also composed of very small patches or stringers bordering waterways, which~~
23 ~~are composed of valley oak and scrub vegetation. Temporary losses of nesting habitat would~~
24 ~~occur where pipelines cross Snodgrass Slough and other small waterways east of the~~
25 ~~Sacramento River, and where temporary work areas surround intake sites. The riparian habitat~~
26 ~~in these areas is also composed of very small patches or stringers bordering waterways, which~~
27 ~~are composed of valley oak and scrub vegetation.~~ Impacts from CM1 would occur in the central
28 delta in CZs 3- 6, and CZ 8. ~~Habitat loss from CM1 activities would have the potential to displace~~
29 ~~individuals, if present, and remove the functions and value of potentially suitable habitat.~~ There
30 are no occurrences of nesting cormorants, herons, ~~or~~ egrets that overlap with the construction
31 footprint of CM1. ~~However, however,~~ Mitigation Measure BIO-75, *Conduct Preconstruction*
32 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize
33 impacts on cormorants, herons and egrets if they were to nest in the vicinity of construction
34 activities. Refer to the Terrestrial Biology Map ~~B~~book in Appendix A of this RDEIR/SDEIS for a
35 detailed view of Alternative 4 construction locations. Impacts from CM1 would occur within the
36 first ~~10-14~~ years of Plan implementation.

- 37 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
38 would result in the combined permanent and temporary loss of up to 177 acres of nesting
39 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.
40 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to
41 improve passage of fish through the bypasses. Most of the riparian losses would occur at the
42 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to
43 improve water movement in the Toe Drain and in the Sacramento Weir would also remove
44 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 4
45 implementation.

- 1 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
2 inundation would permanently remove an estimated 552 acre of nesting habitat for cormorants,
3 herons and egrets. Trees would not be actively removed but tree mortality would be expected
4 over time as areas became tidally inundated. Depending on the extent and value of remaining
5 habitat, this could reduce use of these habitats by these species. There is one CNDDDB occurrence
6 of a great blue heron rookery that overlaps with the hypothetical restoration footprint for tidal
7 restoration. The occurrence is on Decker Island and tidal restoration could potentially impact
8 the nest trees from inundation. This effect would need to be addressed within the project
9 specific analysis for tidal restoration projects.
- 10 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
11 seasonally inundated floodplain would permanently remove approximately 43 acres and
12 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting
13 habitat. These losses would be expected after the first 10 years of Alternative 4 implementation
14 along the San Joaquin River and other major waterways in CZ 7.
- 15 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
16 enhancement-related activities could disturb cormorant, heron, and egret nests if they were
17 present near work sites. A variety of habitat management actions included in CM11 that are
18 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
19 disturbances that could temporarily remove small amounts of cormorant, heron, and egret
20 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing
21 activities, such as removal of nonnative vegetation and road and other infrastructure
22 maintenance, are expected to have minor effects on available habitat for these species and are
23 expected to result in overall improvements to and maintenance of habitat values over the term
24 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be
25 avoided and minimized by the AMMs listed below ([AMMs are described in detail in Appendix](#)
26 [3.C, Avoidance and Minimization Measures, of the Draft BDCP, AMM18 Swainson's Hawk and an](#)
27 [updated version of AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged](#)
28 [Material is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)).
- 29 • Permanent and temporary habitat losses from the above conservation measures would
30 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
31 as riparian habitat within 1 year following completion of construction activities [as described in](#)
32 [AMM10 Restoration of Temporarily Affected Natural Communities](#). Although the effects are
33 considered temporary, the restored riparian habitat would require years to several decades to
34 functionally replace habitat that has been affected and for trees to attain sufficient size and
35 structure for established rookeries. *AMM18 Swainson's Hawk and White-Tailed Kite* contains
36 actions described below to reduce the effect of temporal loss of mature riparian habitat,
37 including the transplanting of mature trees.
- 38 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
39 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
40 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.
41 Maintenance activities would include vegetation management, levee and structure repair, and
42 re-grading of roads and permanent work areas. These effects, however, would be reduced by
43 AMMs and conservation actions as described below.
- 44 • The primary impact of concern regarding double-crested cormorant, great blue heron, great
45 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and

1 other large trees associated with known nest sites. Because these species are highly traditional
2 in their use of rookeries, the establishment of new nest sites is unpredictable. To avoid adverse
3 effects on these species, existing known nest sites would have to be avoided. Mitigation Measure
4 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,
5 would be available to address these adverse effects on cormorants, herons, and egrets.

- 6 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
7 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,
8 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they
9 would be expected to avoid contact with construction and other equipment. If birds were to nest
10 in the construction area, construction-related activities, including equipment operation, noise
11 and visual disturbances could affect nests or lead to their abandonment, potentially resulting in
12 mortality of eggs and nestlings. Mitigation Measure BIO-75 would be available to address these
13 effects on cormorants, herons, and egrets.

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 conclusions are also
16 included.

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 or restoration in an appropriate timeframe to ensure that the
21 effects of construction would not be adverse under NEPA. Alternative 4 would remove ~~539-548~~
22 acres of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These
23 effects would result from the construction of the water conveyance facilities (CM1, ~~64-73~~ acres of
24 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
25 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
26 *Restoration*—475 acres of nesting habitat).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
28 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
29 breeding habitat. Using these ratios would indicate that ~~64-73~~ acres of breeding habitat should be
30 restored/created and ~~64-73~~ acres should be protected to compensate for the CM1 losses of modeled
31 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
32 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
33 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
34 same typical NEPA and CEQA ratios.

35 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
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, of the Draft BDCP*).
38 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
39 habitat for these species. In addition, small but essential nesting habitat associated with cultivated
40 lands would also be maintained and protected such as isolated trees, tree rows along field borders
41 or roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

42 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
43 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and

1 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
 2 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
 3 would require years to several decades to functionally replace habitat that has been affected and for
 4 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
 5 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
 6 herons and egrets in the near-term time period.

7 *AMM18 Swainson's Hawk ~~and White-Tailed Kite~~* would implement a program to plant large mature
 8 trees, including transplanting trees scheduled for removal. These would be supplemented with
 9 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.
 10 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.
 11 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 12 system for every tree 20 feet or taller anticipated to be removed by construction during the near-
 13 term period. A variety of native tree species would be planted to provide trees with differing growth
 14 rates, maturation, and life span. Replacement trees that were incorporated into the riparian
 15 restoration would not be clustered in a single region of the study area, but would be distributed
 16 throughout protected lands.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 24 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 25 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures](#). Double-crested cormorant,
 26 great blue heron, great egret, snowy egret, and black-crowned night heron are not species that are
 27 covered under the BDCP. For the BDCP to avoid adverse effects on individuals, existing nests and
 28 rookeries would have to be avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
 29 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on
 30 nesting cormorants, herons, and egrets.

31 **Late Long-Term Timeframe**

32 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
 33 habitat for cormorants, herons, and egrets. Alternative 4 as a whole would result in the permanent
 34 loss of and temporary effects on ~~871-880~~ acres of potential breeding habitat (5% of the potential
 35 breeding habitat in the Plan Area).

36 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 37 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*
 38 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 39 riparian natural community (see Table 3-4 in Chapter 3, *Description of Alternatives, of this*
 40 [RDEIR/SDEIS](#)). The majority of riparian protection and restoration acres would occur in CZ 7 as part
 41 of a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
 42 community (Objectives VFRNC1.1 and VFRNC1.2 in [BDCP-Chapter 3, Conservation Strategy, of the](#)
 43 [Draft BDCP](#)). Riparian restoration would expand the patches of existing riparian forest in order to
 44 support nesting habitat for riparian species. The Plan's objectives would also benefit cormorants,

1 herons, and egrets by protecting small but essential habitats that occur within cultivated lands, such
2 as tree rows along field borders or roads, and small clusters of trees in farmyards or rural
3 residences(Objective CLNC1.3). In addition, the distribution and abundance of potential nest trees
4 would be increased by planting and maintaining native trees along roadsides and field borders
5 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1).

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
13 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
14 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures](#). Double-crested cormorant,
15 great blue heron, great egret, snowy egret, and black-crowned night heron are not species that are
16 covered under the BDCP. These species are highly traditional in their use of nest sites and for the
17 BDCP to avoid an adverse effect on individuals, preconstruction surveys would be required to
18 ensure that nests are detected and any direct and indirect impacts on rookeries are avoided.
19 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
20 *Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to
21 address adverse effects on nesting cormorants, herons, and egrets.

22 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential direct mortality of these
23 special-status species under Alternative 4 would represent an adverse effect in the absence of other
24 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,
25 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, [AMM10](#),
26 and [AMM18 Swainson’s Hawk and White-Tailed Kite](#), which would be in place [during all project](#)
27 [activities throughout the construction period](#), the effects of habitat loss on cormorants, herons and
28 egrets under Alternative 4 would not be adverse. Double-crested cormorant, great blue heron, great
29 egret, snowy egret, and black-crowned night heron are not species that are covered under the BDCP.
30 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
31 *Nesting Birds*, would be available to address adverse effects on nesting cormorants, herons, and
32 egrets.

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 NEPA. Alternative 4 would remove ~~539~~
39 ~~548~~ acres of nesting habitat for cormorants, herons, and egrets in the study area in the near-term.
40 These effects would result from the construction of the water conveyance facilities (CM1, ~~6473~~
41 acres of nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
42 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
43 *Restoration*—475 acres of nesting habitat).

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 valley/foothill riparian habitat for
3 breeding habitat. Using these ratios would indicate that ~~64-73~~ acres of breeding habitat should be
4 restored/created and ~~64-73~~ acres should be protected to mitigate the CM1 losses of modeled
5 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
6 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
7 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
8 same typical NEPA and CEQA ratios.

9 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
10 system with extensive wide bands or large patches of valley/foothill riparian natural community
11 (Objectives VFRNC1.1 and VFRNC1.2 in ~~BDCP~~ Chapter 3, *Conservation Strategy*, of the Draft BDCP).
12 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
13 habitat for these species. In addition, small but essential nesting habitat associated with cultivated
14 lands would also be maintained and protected such as isolated trees, tree rows along field borders
15 or roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

16 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
17 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
18 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
19 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
20 would require years to several decades to functionally replace habitat that has been affected and for
21 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
22 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
23 herons and egrets in the near-term time period.

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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
31 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
32 RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.

33 ~~AMM18 Swainson's Hawk and White-Tailed Kite~~ would implement a program to plant large mature
34 trees, including transplanting trees scheduled for removal. These would be supplemented with
35 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.
36 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.
37 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
38 system for every tree 20 feet or taller anticipated to be removed by construction during the near-
39 term period. A variety of native tree species would be planted to provide trees with differing growth
40 rates, maturation, and life span. Replacement trees that were incorporated into the riparian
41 restoration would not be clustered in a single region of the study area, but would be distributed
42 throughout protected lands.

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. For the BDCP to avoid an adverse effect on individuals,
8 preconstruction surveys for noncovered avian species would be required to ensure that nests are
9 detected and avoided.

10 ~~In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets~~
11 ~~would represent an adverse effect as a result of habitat modification and potential for direct~~
12 ~~mortality of special-status species. This impact would be considered significant. However, the BDCP~~
13 ~~has committed to habitat protection, restoration, management and enhancement activities~~
14 ~~described above. As outlined in Draft BDCP Chapter 3, Section 3.4.4, Conservation Measures-27,~~
15 ~~natural community restoration and protection are planned so that they keep pace with project~~
16 ~~impacts. and Thus, there would be minimal lag time between impacts and implementation of those~~
17 ~~measures designed to offset those impacts on natural communities and the species that use~~
18 ~~them. The natural community restoration and protection activities would be concluded in the first 10~~
19 ~~years of Plan implementation, which is close enough in time to the occurrence of impacts to~~
20 ~~constitute adequate mitigation for CEQA purposes. In addition, implementation of AMM1-AMM7,~~
21 ~~AMM10, and AMM18 Swainson's Hawk Implementation of, and~~ Mitigation Measure BIO-75, Conduct
22 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce this
23 potential impact to a less-than-significant 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 4 as a whole would result in the permanent
27 loss of and temporary effects on ~~871-880~~ acres of potential breeding habitat (5% of the potential
28 breeding habitat in the Plan 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 (see Table 3-4 in Chapter 3, *Description of Alternatives*, of this
33 ~~RDEIR/SDEIS~~). The majority of riparian protection and restoration acres would occur in CZ 7 as part
34 of a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
35 community (Objectives VFRNC1.1 and VFRNC1.2 in ~~BDCP~~ Chapter 3, *Conservation Strategy*, of the
36 ~~Draft BDCP~~). Riparian restoration would expand the patches of existing riparian forest in order to
37 support nesting habitat for riparian species. The Plan's objectives would also benefit cormorants,
38 herons, and egrets by protecting small but essential habitats that occur within cultivated lands, such
39 as tree rows along field borders or roads, and small clusters of trees in farmyards or rural
40 residences (Objective CLNC1.3). In addition, the distribution and abundance of potential 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).

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
6 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
7 *[RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#) Double-crested cormorant,*
8 *great blue heron, great egret, snowy egret, and black-crowned night heron are not species that are*
9 *covered under the BDCP. These species are highly traditional in their use of nest sites and for the*
10 *BDCP to avoid a significant impact on individuals, preconstruction surveys would be required to*
11 *ensure that nests are detected and any direct and indirect impacts on rookeries are avoided.*
12 *Implementation of Mitigation Measure BIO-75, [Conduct Preconstruction Nesting Bird Surveys and](#)*
13 *[Avoid Disturbance of Nesting Birds](#), and Mitigation Measure BIO-117, [Avoid Impacts on Rookeries](#),*
14 *would reduce this potential impact to a less-than-significant level.*

15 [In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets](#)
16 [would represent an adverse effect as a result of habitat modification and potential for direct](#)
17 [mortality of special-status species. This impact would be considered significant.](#) Considering
18 Alternative 4's protection and restoration provisions, which would provide acreages of new or
19 enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost to
20 construction and restoration activities, and with implementation of AMM1–AMM7, [AMM10](#), [AMM18](#)
21 *Swainson's Hawk* ~~and *White-Tailed Kite*~~ and Mitigation Measure BIO-75, the loss of habitat or direct
22 mortality through implementation of Alternative 4 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 these species. Therefore, the loss of habitat or potential mortality under this alternative would
25 have a less-than-significant impact on cormorants, herons, and egrets.

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 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

30 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
31 therefore, DWR will avoid all direct and indirect impacts on rookeries.

32 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**
33 **Herons and Egrets**

34 [New transmission lines would increase the risk for bird-power line strikes, which could result in](#)
35 [injury or mortality of cormorants, herons and egrets. New transmission lines would increase the](#)
36 [risk for bird-power line strikes, which could result in injury or mortality of least bittern and white-](#)
37 [faced ibis. Waterbirds have a higher susceptibility to collisions than passerines, raptors, and other](#)
38 [birds. Marking transmission lines with flight diverters that make the lines more visible to birds has](#)
39 [been shown to dramatically reduce the incidence of bird mortality \(Brown and Drewien 1995\). Yee](#)
40 [\(2008\) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.](#)
41 [With the implementation of AMM20 Greater Sandhill Crane, all new transmission lines constructed](#)

1 as a result of the project would be fitted with flight diverters which would reduce bird strike risk of
2 cormorants, herons, and egrets.

3 ~~New transmission lines would increase the risk for bird-power line strikes, which could result in~~
4 ~~injury or mortality of cormorants, herons and egrets. AMM20 Greater Sandhill Crane would minimize~~
5 ~~the risk for bird-power line strikes, for these species. This measure would ensure that conductor and~~
6 ~~ground lines are fitted with flight diverters in compliance with the best available practices, such as~~
7 ~~those specified in the USFWS Avian Protection Guidelines and would minimize the potential for an~~
8 ~~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 cormorants, herons, and egrets. The implementation of AMM20
11 Greater Sandhill Crane would require the installation of bird flight diverters on all new transmission
12 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
13 installation of bird flight diverters, the construction and operation of new transmission lines under
14 Alternative 4 would not result in an adverse effect on cormorants, herons, and egrets.~~New~~
15 ~~transmission lines would increase the risk for bird-power line strikes, which could result in injury or~~
16 ~~mortality of cormorants, herons, and egrets. AMM20 Greater Sandhill Crane would reduce the~~
17 ~~potential for collisions on new and select existing powerlines in the study area. The construction of~~
18 ~~new transmission lines would not result in an adverse effect on cormorants, herons, and egrets.~~

19 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
20 could result in injury or mortality of cormorants, herons, and egrets. The implementation of AMM20
21 Greater Sandhill Crane would require the installation of bird flight diverters on all new transmission
22 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
23 installation of bird flight diverters, the construction and operation of new transmission lines under
24 Alternative 4 would not result in an adverse effect on cormorants, herons, and egrets.~~New~~
25 ~~transmission lines would increase the risk for bird-power line strikes, which could result in injury or~~
26 ~~mortality of cormorants, herons, and egrets. AMM20 Greater Sandhill Crane would reduce birdstrike~~
27 ~~on new transmission lines and select existing transmission lines with the installation of flight~~
28 ~~diverters. With these in place, new transmission lines would have a less-than-significant impact on~~
29 ~~cormorants, herons and egrets.~~

30 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

31 **Indirect construction- and operation-related effects:** Construction noise above background noise
32 levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities
33 (Draft BDCP-Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
34 *Conveyance Facility on Sandhill Crane*, Table 4 in Appendix D, Substantive BDCP Revisions, of this
35 RDEIR/SEIS), although there are no available data to determine the extent to which these noise
36 levels could affect cormorants, herons, or egrets. If cormorants, herons or egrets were to nest in or
37 adjacent to work areas, construction and subsequent maintenance-related noise and visual
38 disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of
39 suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
40 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse
41 effects of construction-related activities on survival and productivity of nesting cormorants, herons
42 or egrets. The use of mechanical equipment during water conveyance facilities construction could
43 cause the accidental release of petroleum or other contaminants that could affect cormorants,
44 herons or egrets in the surrounding habitat. The inadvertent discharge of sediment or excessive

1 dust adjacent to suitable habitat could also have an adverse effect on these species. AMM1–AMM7,
2 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the
3 likelihood of such spills and ensure that measures are in place to prevent runoff from the
4 construction area and negative effects of dust on active nests.

5 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
6 mercury in avian species, including cormorants, herons or egrets. A detailed review of the
7 methylmercury issues associated with implementation of the BDCP areis contained in Appendix D,
8 Substantive BDCP Revisions, in this RDEIR/SDEIS, Appendix X-D, which This review includes an
9 overview of the BDCP-related mechanisms that could result in increased mercury in the food web,
10 and how exposure to individual species may occur based on feeding habits and where their habitat
11 overlaps with the areas where mercury bioavailability could increase. Mercury is transformed into
12 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.
14 2008).Bioaccumulation of methlymercuymethylmercury varies by species as there are taxonomic
15 differences in rates of detoxification within the liver (Eagles-Smith et al. 2009). Organisms feeding
16 within pelagic-based (algal) food webs have been found to have higher concentrations of
17 methylmercury than those in benthic or epibenthic food webs; this has been attributed to food chain
18 length and dietary segregation (Grimaldo et al. 2009). That is, the pelagic food chain tends to be
19 longer than the benthic food chain, which allows for greater biomagnification of methylmercury in
20 top predators. Also, there is less prey diversity at the top of the pelagic food chain than in the
21 benthic food chain; pelagic top predators eat smaller fish and little else, while benthic top predators
22 consume a variety of organisms, many of which are lower in the food chain than fishes and thus have
23 less potential for methylmercury biomagnification.

24 Largemouth bass was used as a surrogate species for analysis (Appendix D, Substantive BDCP
25 Revisions, in this RDEIR/SDEIS Appendix D) and the modeled effects of mercury concentrations from
26 changes in water operations under CM1 on largemouth bass did not differ substantially from
27 existing conditions; therefore, results also indicate that cormorant, heron, and egret tissue
28 concentrations would not measurably increase as a result of CM1 implementation.

29 Future operational impacts under CM1 were analyzed using a DSM-2 based model to assess
30 potential effects on mercury concentration and bioavailability resulting from proposed flows.
31 Subsequently, a regression model was used to estimate fish tissue concentrations under these
32 future operational conditions (evaluated starting operations or ESO). Results indicated that changes
33 in total mercury levels in water and fish tissues due to ESO were insignificant (see BDCP Appendix
34 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

35 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
36 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
37 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
38 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
39 could increase bioavailability of mercury ~~(see BDCP Chapter 3, Conservation Strategy, for details of~~
40 ~~restoration)~~. Species sensitivity to methylmercury differs widely and there is a large amount of
41 uncertainty with respect to species-specific effects. Increased methylmercury associated with
42 natural community and floodplain restoration could indirectly affect on cormorants, herons or
43 egrets, via uptake in lower trophic levels (as described in ~~the BDCP, Appendix 5.D, Contaminants, of~~
44 ~~the Draft BDCP~~). Mercury is generally elevated throughout the Delta, and restoration of the lower
45 potential areas in total may result in generalized, very low level increases of mercury. Given that

1 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
2 some level of effects. Restoration in Suisun Marsh would convert managed wetlands to tidal
3 wetlands, which would be expected to result in an overall reduction in mercury methylation.

4 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
5 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
6 *Management* (as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS) contains
7 provisions for project-specific Mercury Management Plans. Site-specific restoration plans that
8 address the creation and mobilization of mercury, as well as monitoring and adaptive management
9 as described in CM12 would be available to address the uncertainty of methylmercury levels in
10 restored tidal marsh and potential impacts on cormorants, herons or egrets.

11 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
12 into the foodweb, *CM12 Methylmercury Management*, is included to provide for site-specific
13 evaluation for each restoration project. On a project-specific basis, where high potential for
14 methylmercury production is identified that restoration design and adaptive management cannot
15 fully address while also meeting restoration objectives, alternate restoration areas ~~will~~would be
16 considered. CM-12 ~~will~~would be implemented in coordination with other similar efforts to address
17 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
18 conservation measure ~~will~~would include the following actions.

- 19 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
20 mercury methylation and bioavailability
- 21 ● Define design elements that minimize conditions conducive to generation of methylmercury in
22 restored areas.
- 23 ● Define adaptive management strategies that can be implemented to monitor and minimize
24 actual postrestoration creation and mobilization of methylmercury.

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 cormorants, herons, and egrets.
4 Marsh (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, of the Draft BDCP](#) for details of restoration).
8 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, [of the Draft EIR/EIS](#)
9 and it was determined that, relative to Existing Conditions and the No Action Alternative, CM1
10 would not result in substantial, long-term increases in selenium concentrations in water in the Delta
11 under any alternative. However, it is difficult to determine whether the effects of potential increases
12 in selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)
13 would lead to adverse effects on cormorants, herons, and egrets.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
15 substantial effect on cormorants, herons, and egrets from increases in selenium associated with
16 restoration activities. This effect would be addressed through the implementation of *AMM27*
17 *Selenium Management* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP](#)
18 [Appendix 3.C, Avoidance and Minimization Measures](#)) which would provide specific tidal habitat
19 restoration design elements to reduce the potential for bioaccumulation of selenium and its
20 bioavailability in tidal habitats. Furthermore, the effectiveness of selenium management to reduce
21 selenium concentrations and/or bioaccumulation would be evaluated separately for each
22 restoration effort as part of design and implementation. This avoidance and minimization measure
23 would be implemented as part of the tidal habitat restoration design schedule.

24 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
25 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,
26 operation and maintenance of the water conveyance facilities, including the transmission facilities,
27 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,
28 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
29 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
30 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in
31 addition to AMM1–AMM7.

32 Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to
33 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
34 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
35 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

36 The implementation of tidal natural communities restoration or floodplain restoration could result
37 in increased exposure of cormorants, herons or egrets to methylmercury through the ingestion of
38 fish in restored tidal areas. However, it is unknown what concentrations of methylmercury are
39 harmful to these species and the potential for increased exposure varies substantially within the
40 study area. [Implementation of CM12 which contains measures to assess the amount of mercury](#)
41 [before project development, followed by appropriate design and adaptation management, would](#)
42 [minimize the potential for increased methylmercury exposure, and would result in no adverse effect](#)
43 [on cormorants, herons, and egrets. Site-specific restoration plans that address the creation and](#)
44 [mobilization of mercury, as well as monitoring and adaptive management as described in CM12,](#)
45 [would address the uncertainty of methylmercury levels in restored tidal marsh in the study area and](#)

~~better inform potential impacts on cormorants, herons, and egrets. The site-specific planning phase of marsh restoration would be the appropriate place to assess the potential for risk of methylmercury exposure for cormorants, herons, and egrets once site-specific sampling and other information could be developed.~~

CEQA Conclusion: Impacts of noise, the potential for hazardous spills, increased dust and sedimentation, and operations and maintenance of the water conveyance facilities would represent an adverse effect in the absence of other conservation actions. This impact would be significant, be less than significant with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, and AMM1-AMM7, would reduce this impact to a less-than-significant level. 7.

Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to selenium which could result in mortality of special-status species. This effect would be addressed through the implementation of AMM27 Selenium Management, which would provide specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With implementation of AMM27, potential for increased selenium exposure would result in no adverse effect on the species.

The implementation of tidal natural communities restoration or floodplain restoration could result in increased exposure of cormorants, herons or egrets to methylmercury, through the ingestion of fish in tidally restored areas. However, it is unknown what concentrations of methylmercury are harmful to these species. Implementation of CM12 which contains measures to assess the amount of mercury before project development, followed by appropriate design and adaptation management, would minimize the potential for increased methylmercury exposure, and would result in no adverse effect on the species. Site-specific restoration plans that address the creation and mobilization of mercury, as well as monitoring and adaptive management as described in CM12 would address the potential impacts of methylmercury levels in restored tidal marsh in the study area on cormorants, herons, and egrets. Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to selenium. This effect would be addressed through the implementation of AMM27 Selenium Management, which would provide specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

With AMM1-7, AMM27, and CM12 in place, in addition to the implementation of Mitigation Measure BIO-75 and BIO-117 measures in place, indirect effects of plan implementation would not result in a substantial adverse effect on cormorants, herons, and egrets through habitat modification or potential mortality. Therefore, the indirect effects of Alternative 4 implementation would have a less-than-significant impact on cormorants, herons, and egrets.

~~Therefore, the indirect effects of Alternative 4 implementation would not have a significant impact on cormorants, herons, and egrets.~~

Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds

See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Measure BIO-117: Avoid Impacts on Rookeries**

2 Hérons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries),
3 therefore all direct and indirect impacts on rookeries must be avoided.

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 and 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 and 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 4, including water conveyance facilities construction
30 and implementation of other conservation components, on short-eared owl and northern harrier.
31 Modeled habitat for short-eared owl and northern harrier include tidal brackish and freshwater
32 emergent wetland, nontidal freshwater perennial emergent wetland, managed wetland, other
33 natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex, and selected
34 cultivated lands.

35 Construction and restoration associated with Alternative 4 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 12-4-46. Full implementation of Alternative 4 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-see Chapter 3, Section 3.3, Biological Goals and Objectives, of the Draft](#)
40 [BDCP](#)).

- 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, AMM1-AMM7, AMM27
21 *Selenium Management* and Mitigation Measure BIO-75, impacts on short-eared owl and northern
22 harrier would not be adverse for NEPA purposes and would be less than significant for CEQA
23 purposes.

1 **Table 12-4-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting and Foraging	2,0121 52	2,0121 52	77368 3	7736 83	NA	NA
Total Impacts CM1		2,0121 52	2,0121 52	77368 3	7736 83		
CM2-CM18	Nesting and Foraging	12,281	46,700	471	1,224	2,926-8,060	5,978
Total Impacts CM2-CM18		12,281	46,700	471	1,224	2,926-8,060	5,978
TOTAL IMPACTS		14,293 433	48,712 852	1,244 154	1,997 907	2,926-8,060	5,978

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

4 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**
5 **and Northern Harrier**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 50,709-759 acres of modeled habitat for short-eared owl and northern harrier (of which
8 48,712-852 acres would be a permanent loss and 1,997-907 acres would be a temporary loss of
9 habitat, Table 12-4-46). Conservation measures that would result in these losses are conveyance
10 facilities and transmission line construction, and establishment and use of reusable tunnel
11 material borrow and spoil areas (CM1), Yolo Bypass Fisheries Enhancement (CM2), tidal habitat
12 restoration (CM4), floodplain restoration (CM5), grassland restoration (CM8), vernal pool and
13 wetland restoration (CM9), marsh restoration (CM10) and construction of conservation hatcheries
14 (CM18). The majority of habitat loss would result from CM4. Habitat enhancement and management
15 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
16 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
17 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
18 or eliminate short-eared owl and northern harrier modeled habitat. Each of these individual
19 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
20 CEQA conclusion follow the individual conservation measure discussions.

- 21 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
22 facilities would result in the combined permanent and temporary loss of up to 2,785-835 acres

1 of modeled short-eared owl and northern harrier habitat (2,012-152
 2 773-683 acres of temporary loss) from CZs 3-6 and CZ 8. Activities that would impact modeled
 3 habitat ~~consist include~~ of tunnel, forebay, and intake construction, permanent and temporary
 4 access roads, ~~and~~ construction of transmission lines, and temporary work areas. The majority of
 5 habitat removed would consist of grassland and alfalfa fields. There are no CNDDB or DHCCP
 6 surveys records of occurrences of nesting short-eared owl ~~and northern harrier~~ that overlap
 7 with the construction footprint of CM1. However, there are two DHCCP occurrences of northern
 8 harrier that overlap with the footprint of a shaft associated with the pumps at Clifton Court
 9 Forebay and a permanent transmission line north of the forebay. Two DHCCP occurrences also
 10 overlap with the temporary impact footprint from geotechnical explorations. However,
 11 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
 12 *of Nesting Birds*, would be available to minimize impacts on short-eared owl and northern
 13 harrier if they were to nest in the vicinity of construction activities. Refer to the Terrestrial
 14 Biology Map ~~B~~book in Appendix A of this RDEIR/SDEIS for a detailed view of Alternative 4
 15 construction locations. Impacts from CM1 would occur within the first 10-14 years of Plan
 16 implementation.

- 17 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 18 (CM2) would permanently remove 1,021 acres of modeled short-eared owl and northern harrier
 19 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily
 20 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is
 21 expected to occur during the first 10 years of Alternative 4 implementation.
- 22 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 23 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl
 24 and northern harrier habitat. The majority of the losses would be managed wetlands and
 25 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would
 26 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas
 27 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,
 28 although existing nesting habitat for short-eared owl and northern harrier would be removed,
 29 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by
 30 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known
 31 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River
 32 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for *CM4*
 33 *Tidal Natural Communities Restoration*. However, this is an important breeding area for short-
 34 eared owl and if restoration footprints were changed during the implementation process of
 35 BDCP to overlap with this area, the effects on breeding short-eared owls could likely be adverse.
 36 Future NEPA and CEQA analysis would be conducted for restoration projects under BDCP and if
 37 restoration was proposed to occur outside of the hypothetical footprints used for this
 38 programmatic analysis, potential impacts on these species would be captured in the project-
 39 level analysis (see Appendix 3B, Section 3.2.5 BDCP Tidal Habitat Evolution Assessment, of the
 40 Draft BDCP).
- 41 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 42 seasonally inundated floodplain would permanently and temporarily remove approximately
 43 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754
 44 temporary). These losses would be expected to occur along the San Joaquin River and other
 45 major waterways in CZ 7.

- 1 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
2 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal
3 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 4 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
5 implemented on agricultural lands and would result in the conversion of 1,066 acres of
6 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland
7 would provide habitat for short-eared owl and northern harrier.
- 8 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
9 actions included in CM11 that are designed to enhance wildlife values in restored or protected
10 habitats could result in localized ground disturbances that could temporarily remove small
11 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
12 vegetation and road and other infrastructure maintenance activities, would be expected to have
13 minor adverse effects on available habitat and would be expected to result in overall
14 improvements to and maintenance of habitat values over the term of the BDCP.
- 15 Habitat management- and enhancement-related activities could short-eared owl and northern
16 harrier nests. If either species were to nest in the vicinity of a worksite, equipment operation
17 could destroy nests, and noise and visual disturbances could lead to their abandonment,
18 resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction*
19 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize
20 these adverse effects.
- 21 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-
22 eared owl and northern harrier habitat for the development of a delta and longfin smelt
23 conservation hatchery in CZ 1. The loss is expected to occur during 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 short-eared owl and northern harrier use of the surrounding
28 habitat. Maintenance activities would include vegetation management, levee and structure
29 repair, and re-grading of roads and permanent work areas. These effects, however, would be
30 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described
31 below.
- 32 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
33 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in
34 the Plan Area, because they would be expected to avoid contact with construction and other
35 equipment. If either species were to nest in the construction area, construction-related
36 activities, including equipment operation, noise and visual disturbances could destroy nests or
37 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
38 75 would be available to minimize these adverse effects.

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 or restoration in an appropriate timeframe to ensure that the effects of
5 construction would not be adverse under NEPA. Alternative 4 would remove 15,537-587 acres of
6 modeled habitat (14,293-433 permanent, 1,244-154 temporary) for short-eared owl and northern
7 harrier in the study area in the near-term. These effects would result from the construction of the
8 water conveyance facilities (CM1, 2,785-835 acres), and implementing other conservation measures
9 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5
10 Seasonally Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8
11 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation
12 Hatcheries—12,752 acres).

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
14 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
15 would indicate that 2,785-835 acres of habitat should be restored and 2,785-835 acres should be
16 protected to compensate for the CM1 losses of short-eared owl and northern harrier habitat. The
17 near-term effects of other conservation actions would remove 12,752 acres of modeled habitat, and
18 therefore require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and
19 northern harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1
20 for protection).

21 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
22 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
23 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
24 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
25 habitat, and restoring 19,150 acres of tidal wetlands ([see](#) Table 3-4 in Chapter 3, *Description of*
26 *Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3, CM4, and
27 CM8 and would occur in the same timeframe as the construction and early restoration losses. The
28 acres of protection and restoration contained in the near-term Plan goals satisfy the typical
29 mitigation ratios that would be applied to the project-level effects of CM1 and the effects from other
30 near-term restoration actions.

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, 8, and 11 would be associated with vernal pool and alkali
33 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
34 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
35 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
36 of current levels of habitat fragmentation. Small mammal populations would also be increased on
37 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
38 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
39 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
40 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
41 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 currently
4 supports a high concentration of nesting short-eared owls on Grizzley Island.

5 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
6 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
7 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,
8 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and
9 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A
10 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,
11 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an
12 estimate for the proportion of cultivated lands protected in the near-term time period which would
13 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These
14 biological goals and objectives would inform the near-term protection and restoration efforts and
15 represent performance standards for considering the effectiveness of 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*, 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
23 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
24 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

25 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP
26 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would
27 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
28 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
29 address this adverse effect.

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

31 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
32 and foraging habitat for short-eared owl and northern harrier. Alternative 4 as a whole would result
33 in the permanent loss of and temporary effects on 50,709-759 acres of modeled short-eared owl and
34 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).
35 The locations of these losses are described above in the analyses of individual conservation
36 measures.

37 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
38 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*
39 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
40 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
41 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
42 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands ([see](#) Table 3-4
43 in Chapter 3, [Description of Alternatives, of this RDEIR/SDEIS](#)).

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 ASWNC2.4,
 8 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
 9 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
 10 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
 11 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 34 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 35 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures](#). Short-eared owl and
 36 northern harrier are not species that are covered under the BDCP. For the BDCP to avoid an adverse
 37 effect on individuals, preconstruction surveys for noncovered avian species would be required to
 38 ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
 39 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 40 address this effect.

41 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential direct
 42 mortality of these special-status species under Alternative 4 would represent an adverse effect in
 43 the absence of other conservation actions. However, with habitat protection and restoration
 44 associated with CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–
 45 AMM7, which would be in place [during all project activities throughout the construction period](#), the
 46 effects of habitat loss from Alternative 4 would not be adverse. Short-eared owl and northern

1 harrier are not covered species under the BDCP, and preconstruction surveys for noncovered avian
2 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75
3 would be available to address the adverse effect of direct mortality on short-eared owl and northern
4 harrier.

5 **CEQA Conclusion:**

6 ***Near-Term Timeframe***

7 Because the water conveyance facilities construction is being evaluated at the project level, the near-
8 term BDCP conservation strategy has been evaluated to determine whether it would provide
9 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
10 construction would be less than significant under CEQA. Alternative 4 would remove 15,537-587
11 acres of modeled habitat (14,293-433 permanent, 1,244-154 temporary) for short-eared owl and
12 northern harrier in the study area in the near-term. These effects would result from the construction
13 of the water conveyance facilities (CM1, 2,785-835 acres), and implementing other conservation
14 measures (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5
15 Seasonally Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8
16 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation
17 Hatcheries—12,752 acres).

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
19 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
20 would indicate that 2,785-835 acres of habitat should be restored and 2,785-835 acres should be
21 protected to compensate for the CM1 losses of short-eared owl and northern harrier habitat. The
22 near-term effects of other conservation actions would remove 12,752 acres of modeled habitat, and
23 therefore require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and
24 northern harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1
25 for protection).

26 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
27 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
28 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
29 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
30 habitat, and restoring 19,150 acres of tidal wetlands ([see](#) Table 3-4 in Chapter 3, *Description of*
31 *Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with CM3, CM4, and
32 CM8 and would occur in the same timeframe as the construction and early restoration losses. The
33 acres of protection and restoration contained in the near-term Plan goals satisfy the typical
34 mitigation ratios that would be applied to the project-level effects of CM1 and the effects from other
35 near-term restoration actions.

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, 8, and 11 would be associated with vernal pool and alkali
38 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
39 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
40 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
41 of current levels of habitat fragmentation. Small mammal populations would also be increased on
42 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
43 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
44 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and

1 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
2 other uncultivated areas would also be protected and maintained as part of the cultivated lands
3 reserve system which would provide additional foraging habitat and a source of rodent prey that
4 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
5 (including upland grassland components) would preserve habitat for short-eared owl and northern
6 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
7 objective would focus on highly degraded areas in order to provide the greatest possible level of
8 enhancement benefit to the managed wetland natural community and associated species. Managed
9 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
10 high concentration of nesting short-eared owls on Grizzley Island.

11 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
12 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
13 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,
14 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and
15 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A
16 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,
17 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an
18 estimate for the proportion of cultivated lands protected in the near-term time period which would
19 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These
20 biological goals and objectives would inform the near-term protection and restoration efforts and
21 represent performance standards for considering the effectiveness of restoration actions.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
29 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
30 *[RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

31 The short-eared owl and the northern harrier are not covered species under the BDCP. In order for
32 the BDCP to avoid adverse effects on individuals, preconstruction surveys for noncovered avian
33 species would be required to ensure that nests are detected and avoided.

34 In the absence of other conservation actions, effects on short-eared owl and northern harrier would
35 represent an adverse effect as a result of habitat modification and potential for direct mortality of
36 special-status species. This impact would be considered significant. However, the BDCP has
37 committed to habitat protection, restoration, management and enhancement activities described
38 above. As outlined in Draft BDCP Chapter 3, Section 3.4.4, Conservation Measures-27, natural
39 community restoration and protection are planned so that they keep pace with project impacts. and
40 Thus, there would be minimal lag time between impacts and implementation of those measures
41 designed to offset those impacts on natural communities and the species that use them. The
42 natural community restoration and protection activities would be concluded in the first 10 years of
43 Plan implementation, which is close enough in time to the occurrence of impacts to constitute
44 adequate mitigation for CEQA purposes. In addition, implementation of AMM1--AMM7 and

1 Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of
2 Nesting Birds, would reduce this potential impact to a less-than-significant level.

3 ~~The implementation of Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and~~
4 ~~Avoid Disturbance of Nesting Birds, would reduce this potential impact to a less-than-significant~~
5 ~~level.~~

6 **Late Long-Term Timeframe**

7 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
8 and foraging habitat for short-eared owl and northern harrier. Alternative 4 as a whole would result
9 in the permanent loss of and temporary effects on 50,709-759 acres of modeled short-eared owl and
10 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).
11 The locations of these losses are described above in the analyses of individual conservation
12 measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
14 *Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Community*
15 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
16 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
17 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
18 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (see Table 3-4
19 in Chapter 3, Description of Alternatives, of this RDEIR/SDEIS).

20 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
21 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
22 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
23 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
24 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
25 of current levels of habitat fragmentation. Small mammal populations would also be increased on
26 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
27 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
28 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
29 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
30 other uncultivated areas would also be protected and maintained as part of the cultivated lands
31 reserve system which would provide additional foraging habitat and a source of rodent prey that
32 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
33 (including upland grassland components) would preserve habitat for short-eared owl and northern
34 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
35 objective would focus on highly degraded areas in order to provide the greatest possible level of
36 enhancement benefit to the managed wetland natural community and associated species. Managed
37 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
38 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
39 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
40 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
41 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
42 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
43 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected

1 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
2 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these 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*, 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
10 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
11 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures](#). Short-eared owl and
12 northern harrier are not species that are covered under the BDCP. For the BDCP to have a less-than-
13 significant impact on individuals, preconstruction surveys for noncovered avian species would be
14 required to ensure that active nests are detected and avoided. Implementation of Mitigation
15 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
16 *Birds*, would be reduce the impact to a less-than-significant level.

17 [In the absence of other conservation actions, effects on short-eared owl and northern harrier would](#)
18 [represent an adverse effect as a result of habitat modification and potential for direct mortality of](#)
19 [special-status species. This impact would be considered significant.](#) Considering Alternative 4's
20 protection and restoration provisions, which would provide acreages of new high-value or enhanced
21 habitat in amounts suitable to compensate for habitats lost to construction and restoration
22 activities, and with the implementation of AMM1–AMM7 and Mitigation Measure BIO-75, the loss of
23 habitat or direct mortality through implementation of Alternative 4 would not result in a substantial
24 adverse effect through habitat modifications and would not substantially reduce the number or
25 restrict the range of either species. Therefore, the loss of habitat or potential mortality under this
26 alternative would have a less-than-significant impact on short-eared owl and northern harrier.

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-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical** 31 **Transmission Facilities**

32 [New transmission lines would increase the risk that short-eared owl and northern harrier could be](#)
33 [subject to power line strikes, which could result in injury or mortality of these species. Short-eared](#)
34 [owl and northern harrier would be at low risk of bird strike mortality based on their keen eyesight](#)
35 [and largely ground-based foraging behavior \(BDCP Attachment 5.I-2, Memorandum: Analysis of](#)
36 [Potential Bird Collisions at Proposed BDCP Transmission Lines\).](#) The existing network of transmission
37 lines in the project area currently poses the same small risk for these species, and any incremental
38 risk associated with the new power line corridors would also be expected to be low. Marking
39 transmission lines with flight diverters that make the lines more visible to birds has been shown to
40 dramatically reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)
41 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. With the
42 implementation of *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted

1 with flight diverters which would further reduce any bird strike risk of short-eared owl and
2 northern harrier.

3 ~~New transmission lines would increase the risk that short-eared owl and northern harrier could be~~
4 ~~subject to power line strikes, which could result in injury or mortality of these species. Short-eared~~
5 ~~owl and northern harrier would be at low risk of bird strike mortality based on factors assessed in~~
6 ~~the bird strike vulnerability analysis (BDCP Attachment 5.J-2, Memorandum: Analysis of Potential~~
7 ~~Bird Collisions at Proposed BDCP Transmission Lines). Factors analyzed include the height of the new~~
8 ~~transmission lines and the flight behavior of species. The existing network of transmission lines in~~
9 ~~the Plan Area currently poses the same small risk for these species, and any incremental risk~~
10 ~~associated with the new power line corridors would also be expected to be low. AMM20 Greater~~
11 ~~Sandhill Crane, would further reduce any potential effects.~~

12 NEPA Effects: The construction and presence of new transmission lines would not result in an
13 adverse effect on short-eared owl or northern harrier because the risk of bird strike is considered to
14 be low for both species based on their keen eyesight and behavioral characteristics. New
15 transmission lines would minimally increase the risk for short-eared owl and northern harrier
16 power line strikes. All new transmission lines constructed as a result of the project would be fitted
17 with bird diverters (AMM20 Greater Sandhill Crane), which have been shown to reduce avian
18 mortality by 60%, which would further reduce any potential for powerline collisions. Therefore, the
19 construction and operation of transmission lines under Alternative 4 would not result in an adverse
20 effect on short-eared owl or northern harrier.~~New transmission lines would minimally increase the~~
21 ~~risk for short-eared owl and northern harrier power line strikes. With the implementation of~~
22 ~~AMM20 Greater Sandhill Crane, the potential effect of the construction of new transmission lines on~~
23 ~~short-eared owl and northern harrier would not be adverse.~~

24 CEQA Conclusion: The construction and presence of new transmission lines would not result in a
25 significant impact on short-eared owl or northern harrier because the risk of bird strike is
26 considered to be low for both species based on their keen eyesight and behavioral characteristics.
27 New transmission lines would minimally increase the risk for short-eared owl and northern harrier
28 power line strikes. All new transmission lines constructed as a result of the project would be fitted
29 with bird diverters (AMM20 Greater Sandhill Crane), which have been shown to reduce avian
30 mortality by 60%, which would further reduce any potential for powerline collisions. Therefore, the
31 construction and operation of transmission lines under Alternative 4 would result in a less-than-
32 significant impact on short-eared owl or northern harrier.~~New transmission lines would minimally~~
33 ~~increase the risk for short-eared owl and northern harrier power line strikes. AMM20 Greater~~
34 ~~Sandhill Crane would reduce the potential impact of the construction of new transmission lines on~~
35 ~~short-eared owl and northern harrier to a less-than-significant level.~~

36 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern** 37 **Harrier**

38 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated
39 with construction-related activities could result in temporary disturbances that affect short-eared
40 owl and northern harrier use of modeled habitat. Construction noise above background noise levels
41 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (~~Draft~~
42 ~~BDCP~~ Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
43 *Facility on Sandhill Crane*, Table 4 in Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS),
44 although there are no available data to determine the extent to which these noise levels could affect

1 short-eared owl or northern harrier. Indirect effects associated with construction include noise,
 2 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
 3 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
 4 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
 5 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 6 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
 7 of mechanical equipment during water conveyance construction could cause the accidental release
 8 of petroleum or other contaminants that could affect these species or their prey in the surrounding
 9 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
 10 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
 11 or excessive dust adjacent to short-eared owl and northern harrier could also have a negative effect
 12 on these species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
 13 construction area and the negative effects of dust on wildlife adjacent to work areas.

14 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 15 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)
 16 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
 17 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
 18 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
 19 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
 20 mercury (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration).
 21 Species sensitivity to methylmercury differs widely and there is a large amount of uncertainty with
 22 respect to species-specific effects. Increased methylmercury associated with natural community and
 23 floodplain restoration could indirectly affect short-eared owl and northern harrier, via uptake in
 24 lower tropic levels (as described in [the BDCP-Appendix 5.D, Contaminants, of the Draft BDCP](#)).

25 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
 26 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
 27 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
 28 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
 29 adaptive management as described in CM12 would be available to address the uncertainty of
 30 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and
 31 northern harrier.

32 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 33 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 34 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 35 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 36 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 37 classes within a species. In addition, the effect of selenium on a species can be confounded by
 38 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 39 2009).

40 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 41 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 42 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 43 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 44 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 45 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et

1 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 2 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 3 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 4 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic
 5 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 6 levels of selenium have a higher risk of selenium toxicity.

7 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 8 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 9 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern
 10 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 11 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
 12 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
 13 bioavailability of selenium (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details
 14 of restoration). Changes in selenium concentrations were analyzed in Chapter 8, [Water Quality, of](#)
 15 [the Draft EIR/EIS](#) and it was determined that, relative to Existing Conditions and the No Action
 16 Alternative, CM1 would not result in substantial, long-term increases in selenium concentrations in
 17 water in the Delta under any alternative. However, it is difficult to determine whether the effects of
 18 potential increases in selenium bioavailability associated with restoration-related conservation
 19 measures (CM4, CM5) would lead to adverse effects on short-eared owl and northern harrier.

20 Because of the uncertainty that exists at this programmatic level of review, there could be a
 21 substantial effect on short-eared owl and northern harrier from increases in selenium associated
 22 with restoration activities. This effect would be addressed through the implementation of *AMM27*
 23 *Selenium Management* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~BDCP~~
 24 [Appendix 3-C, Avoidance and Minimization Measures](#)) which would provide specific tidal habitat
 25 restoration design elements to reduce the potential for bioaccumulation of selenium and its
 26 bioavailability in tidal habitats. Furthermore, the effectiveness of selenium management to reduce
 27 selenium concentrations and/or bioaccumulation would be evaluated separately for each
 28 restoration effort as part of design and implementation. This avoidance and minimization measure
 29 would be implemented as part of the tidal habitat restoration design schedule.

30 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 31 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.
 32 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
 33 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-
 34 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
 35 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 36 address adverse effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat restoration
 37 could result in increased exposure of short-eared owl and northern harrier. This effect would be
 38 addressed through the implementation of *AMM27 Selenium Management*, which would provide
 39 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
 40 selenium and its bioavailability in tidal habitats.

41 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern
 42 harrier through increased exposure to methylmercury, as these species currently nest and forage in
 43 tidal marshes where elevated methylmercury levels exist. However, it is unknown what
 44 concentrations of methylmercury are harmful to the species and the potential for increased
 45 exposure varies substantially within the study area. Site-specific restoration plans in addition to

1 monitoring and adaptive management, described in CM12 *Methylmercury Management*, would
2 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning
3 phase of marsh restoration would be the appropriate place to assess the potential for risk of
4 methylmercury exposure for California least tern, once site specific sampling and other information
5 could be developed.

6 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
7 operations and maintenance of the water conveyance facilities would have a less-than-significant
8 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure
9 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
10 AMM1-AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl
11 and northern harrier through increased exposure to methylmercury, as these species currently nest
12 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown
13 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans
14 that address the creation and mobilization of mercury, as well as monitoring and adaptive
15 management as described in CM12 would better inform potential impacts and address the
16 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat
17 restoration could result in increased exposure of short-eared owl and northern harrier to selenium.
18 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
19 would provide specific tidal habitat restoration design elements to reduce the potential for
20 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of
21 Alternative 4 implementation would not have an adverse effect on short-eared owl and northern
22 harrier.

23 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
24 **Disturbance of Nesting Birds**

25 See Mitigation Measure BIO-75 under Impact BIO-75.

26 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**
27 **Result of Implementation of Conservation Components**

28 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
29 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926-
30 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-4-46).

31 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
32 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled
33 habitat (Table 12-4-46), the majority of which would be pasture and other cultivated lands.

34 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
35 season due to periodic inundation. However, inundation would occur during the nonbreeding
36 season and would not be expected to have an adverse effect on either species.

37 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-
38 eared owl and northern harrier because inundation is expected to occur prior to the breeding
39 season.

40 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-
41 eared owl and northern harrier because inundation is expected to occur prior to the breeding
42 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 4, including water conveyance facilities construction
8 and implementation of other conservation components, on mountain plover. Modeled habitat for
9 mountain plover include grassland, alkali seasonal wetland, vernal pool complex, alfalfa, grain and
10 hay, pasture, and idle cropland throughout the study area.

11 Construction and restoration associated with Alternative 4 conservation measures would result in
12 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table
13 12-4-47. Full implementation of Alternative 4 would include the following biological objectives over
14 the term of the BDCP which would also benefit the mountain plover ([BDCP see Chapter 3, Section](#)
15 [3.3, Biological Goals and Objectives, of the Draft BDCP](#)).

- 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, 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.

1 **Table 12-4-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Wintering	1,969 67	1,969 67	633 50	633 50	NA	NA
Total Impacts CM1		1,969 67	1,969 67	633 50	633 50		
CM2-CM18	Wintering	5,450	26,198	376	893	1,158-3,650	3,823
Total Impacts CM2-CM18		5,450	26,198	376	893	1,158-3,650	3,823
TOTAL IMPACTS		7,419 17	28,167 165	1,009 879	1,526 1,396	1,158-3,650	3,823

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

2

3 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

4 Alternative 4 conservation measures would result in the combined permanent and temporary loss
 5 of up to 29,693-561 acres of modeled wintering habitat for mountain plover (28,167-165 acres of
 6 permanent loss and 1,526-396 of temporary loss, Table 12-4-47). Conservation measures that would
 7 result in these losses are conveyance facilities and transmission line construction, and establishment
 8 and use of reusable tunnel material borrow and spoil areas (CM1), Yolo Bypass fisheries
 9 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian
 10 restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),
 11 nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The
 12 majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and
 13 management activities (CM11), which include ground disturbance or removal of nonnative
 14 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
 15 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
 16 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
 17 mountain plover modeled wintering habitat. Each of these individual activities is described below. A
 18 summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the
 19 individual conservation measure discussions.

- 20 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
 21 facilities would result in the combined permanent and temporary loss of up to 2,602-470 acres
 22 of modeled mountain plover habitat (1,969-967 acres of permanent loss, 633-503 acres of

temporary loss). ~~Impacts would occur from the construction of Intakes 2, 3, and 5 and associated temporary work areas and access roads in CZ 4 between Clarksburg and Courtland; the rerouting of Highway 160; construction of the intermediate forebay; and from a reusable tunnel material storage area on Bouldin Island. The construction of the permanent and temporary transmission line corridors through CZs 4-6 and 9 would also remove suitable habitat for the species. Approximately 796 acres of impact would be from the placement of reusable tunnel material area west of the Clifton Court Forebay in CZ 8. In addition, permanent habitat loss would occur from the construction of the new forebay south of the existing Clifton court Forebay in CZ 8. The construction of the permanent and temporary transmission line corridors through CZs 4-6 and 9 would remove suitable wintering 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. Some of the grassland habitat lost at the sites of new canals south of Clifton Court Forebay is composed of larger stands of ruderal and herbaceous vegetation and California annual grassland, which is also suitable habitat for the species.~~ There are no CNDDDB occurrences of mountain plover that intersect with the CM1 footprint. However, the study area does overlap with the wintering range for the species. Refer to the Terrestrial Biology Map ~~Book~~ in Appendix A of this RDEIR/SDEIS for a detailed view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-~~14~~ years of Plan implementation.

- *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 modeled mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture. Most of the grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland complex habitat as a new channel is constructed. The loss is expected to occur during the first 10 years of Alternative 4 implementation.
- *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and inundation would permanently remove an estimated 20,880 acres of modeled mountain plover habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun Marsh.
- *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore seasonally inundated floodplain would permanently and temporarily remove approximately 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses would be expected after the first 10 years of Alternative 4 implementation along the San Joaquin River and other major waterways in CZ 7.
- *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and 1,489 acres of habitat as part of seasonal floodplain restoration.

- 1 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
2 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
3 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
4 would be restored after the construction periods. Grassland restoration would be implemented
5 on agricultural lands that also provide wintering habitat for mountain plover and would result
6 in the conversion of 837 acres of cultivated lands to grassland.
- 7 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
8 removal of 705 acres of mountain plover habitat.
- 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 mountain plover 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 mountain plover habitat. Management of grasslands and
15 cultivated lands for mountain plover such as grazing or mowing would make habitat
16 temporarily unavailable for the species but would ultimately make the habitat more suitable for
17 mountain plover. CM11 would also include the construction of recreational-related facilities
18 including trails, interpretive signs, and picnic tables (BDCP-see Chapter 4, Covered Activities and
19 Associated Federal Actions, of the Draft BDCP). The construction of trailhead facilities, signs,
20 staging areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when
21 and where possible. However, approximately 50 acres of grassland habitat would be lost from
22 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. Alternative 4 would remove 8,428-296
43 acres (7,419-417 permanent, 1,009-879 temporary) of modeled mountain plover wintering habitat

1 in the study area in the near-term. These effects would result from the construction of the water
 2 conveyance facilities (CM1, 2,602-470 acres), and implementing other conservation measures (CM2
 3 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian*
 4 *Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and*
 5 *Alkali Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and*
 6 *Management* 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 5,2044,940 acres should
 9 be protected to compensate for the CM1 losses of 2,602-470 acres of mountain plover wintering
 10 habitat. The near-term effects of other conservation actions would remove 5,826 acres of modeled
 11 habitat, and therefore require 11,652 acres of protection of mountain plover habitat using the same
 12 typical 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 (see Table
 16 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are
 17 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
 18 early restoration losses thereby avoiding adverse effects of habitat loss on mountain plover
 19 wintering in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8,
 20 and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
 21 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 22 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 23 pool natural communities which would expand mountain plover wintering habitat and reduce the
 24 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
 25 *and Management*, insect prey populations would be increased on protected lands, enhancing the
 26 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 27 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 28 approximately 15,400 acres of potential wintering habitat for mountain plover (Objective CLNC1.1).
 29 Approximately 87% of cultivated lands protected by the late long-term time period would be in
 30 alfalfa and pasture crop types (very high- and high-value crop types for Swainson’s hawk (Objective
 31 SH1.2) which are also modeled habitat for wintering mountain plover. This biological objective
 32 provides an estimate for the high proportion of cultivated lands protected in the near-term time
 33 period which would be suitable for mountain plover.

34 The acres of restoration and protection contained in the near-term Plan goals and the additional
 35 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
 36 level effects of CM1 on mountain plover, as well as mitigate the near-term effects of the other
 37 conservation measures with the consideration that some portion of the 15,400 acres of cultivated
 38 lands protected in the near-term timeframe would be managed in suitable crop types to compensate
 39 for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-125, *Compensate for the Near-Term*
 40 *Loss of Mountain Plover Wintering Habitat*, would be available to address the adverse effect of
 41 habitat loss in the near-term.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 4 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 5 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

6 **Late Long-Term Timeframe**

7 Based on the habitat model, the study area supports approximately 269,411 acres of potential
 8 habitat for mountain plover. Alternative 4 as a whole would result in the permanent loss of and
 9 temporary effects on 29,692-561 acres of modeled mountain plover wintering habitat during the
 10 term of the Plan. The locations of these losses are described above in the analyses of individual
 11 conservation measures. The Plan includes conservation commitments through *CM3 Natural*
 12 *Communities Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9*
 13 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore
 14 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150
 15 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide
 16 suitable habitat for native wildlife species (see Table 3-4 in Chapter 3, [Description of Alternatives, of](#)
 17 [this RDEIR/SDEIS](#)). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
 18 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with
 19 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
 20 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
 21 communities which would expand habitat for mountain plover and reduce the effects of current
 22 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,
 23 insect prey populations would be increased on protected lands, enhancing the foraging value of
 24 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that
 25 provide habitat for covered and other native wildlife species would provide approximately 15,400
 26 acres of potential wintering habitat for mountain plover (Objective CLNC1.1). Approximately 42,275
 27 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-
 28 value crop types for Swainson’s hawk (Objective SH1.2) which would also provide potential
 29 wintering habitat for mountain plover. The Plan also includes commitments to implement *AMM1*
 30 *Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
 31 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
 32 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable*
 33 *Tunnel Material, and Dredged Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include
 34 elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent
 35 to work areas. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization](#)
 36 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)
 37 [Substantive BDCP Revisions, of this RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization](#)
 38 [Measures.](#)

39 **NEPA Effects:** The loss of mountain plover habitat and potential mortality of this special-status
 40 species under Alternative 4 would represent an adverse effect in the absence of other conservation
 41 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and
 42 CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place
 43 [during all project activities throughout the construction period](#), and with implementation of
 44 Mitigation Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering*
 45 *Habitat*, the effects of habitat loss and potential direct mortality on mountain plover under
 46 Alternative 4 would 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 or restoration in an appropriate timeframe to ensure that the
 6 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,428
 7 296 acres (7,419-417 permanent, 1,009-879 temporary) of modeled wintering habitat for mountain
 8 plover in the study area in the near-term. These effects would result from the construction of the
 9 water conveyance facilities (CM1, 2,602-470 acres), and implementing other conservation measures
 10 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian
 11 Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and
 12 Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and
 13 Management and CM18 Conservation Hatcheries—5,826 acres).

14 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
 15 would be 2:1 for protection of habitat. Using this ratio would indicate that 54,204-940 acres should
 16 be protected to mitigate the CM1 losses of 2,602-470 acres of mountain plover habitat. The near-
 17 term effects of other conservation actions would remove 5,826 acres of modeled habitat, and
 18 therefore require 11,652 acres of protection of mountain plover wintering habitat using the same
 19 typical NEPA and CEQA ratio (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 (see Table
 23 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are
 24 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
 25 early restoration losses thereby avoiding significant impacts of habitat loss on mountain plover.
 26 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 27 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 28 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
 29 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
 30 would expand wintering habitat for mountain plover and reduce the effects of current levels of
 31 habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
 32 populations would be increased on protected lands, enhancing the foraging value of these natural
 33 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
 34 for covered and other native wildlife species would provide approximately 15,400 acres of potential
 35 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands
 36 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
 37 and high-value crop types for Swainson’s hawk (Objective SH1.2) which would also provide
 38 potential habitat for mountain plover wintering in the study area. This biological objective provides
 39 an estimate for the high proportion of cultivated lands protected in the near-term time period which
 40 would provide habitat for mountain plover.

41 These Plan objectives represent performance standards for considering the effectiveness of
 42 conservation actions. The acres of restoration and protection contained in the near-term Plan goals
 43 and the additional detail in the biological objectives satisfy the typical mitigation that would be
 44 applied to the project-level effects of CM1 on mountain plover, as well as mitigate the near-term

1 effects of the other conservation measures with the consideration that some portion of the 15,400
2 acres of cultivated lands protected in the near-term timeframe would be managed in suitable crop
3 types to compensate for the loss of habitat at a ratio of 2:1.

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 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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
11 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
12 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

13 In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets
14 would represent an adverse effect as a result of habitat modification and potential for direct
15 mortality of special-status species. This impact would be considered significant. However, the BDCP
16 has committed to habitat protection, restoration, management and enhancement activities
17 described above. As outlined in Draft BDCP Chapter 3, Section 3.4, Conservation Measures 4-27,
18 natural community restoration and protection are planned so that they keep pace with project
19 impacts and thus there would be minimal lag time between impacts and those measures designed to
20 offset those impacts to natural communities and the species that use them. The natural community
21 restoration and protection activities would be concluded in the first 10 years of Plan
22 implementation, which is close enough in time to the occurrence of impacts to constitute adequate
23 mitigation for CEQA purposes. In addition, implementation of AMM1-AMM7 and AMM18 Swainson's
24 Hawk, The implementation of and Mitigation Measure BIO-125, Compensate for the Near-Term Loss of
25 Mountain Plover Wintering Habitat would reduce the this potential impact of habitat loss in the near-
26 term to a less-than-significant 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 **Late Long-Term Timeframe**

35 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692-561
36 acres of mountain plover habitat during the term of the Plan (11% of the total habitat in the study
37 area). The locations of these losses are described above in the analyses of individual conservation
38 measures. The Plan includes conservation commitments through CM3 Natural Communities
39 Protection and Restoration, CM8 Grassland Natural Community Restoration, and CM9 Vernal Pool and
40 Alkali Seasonal Wetland Complex Restoration to protect 8,000 acres and restore 2,000 acres of
41 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
42 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
43 for native wildlife species (see Table 3-4 in Chapter 3, Description of Alternatives, of this
44 RDEIR/SDEIS). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
45 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with

1 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
2 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
3 communities which would expand wintering habitat for mountain plover and reduce the effects of
4 current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*
5 *Management*, insect prey populations would be increased on protected lands, enhancing the
6 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
7 Cultivated lands that provide habitat for covered and other native wildlife species would provide
8 approximately 15,400 acres of potential habitat for mountain plover (Objective CLNC1.1).
9 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types
10 (very high- and high-value crop types for Swainson's hawk (Objective SH1.2) which would also
11 provide habitat for mountain plover.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
19 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
20 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

21 [In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets](#)
22 [would represent an adverse effect as a result of habitat modification and potential for direct](#)
23 [mortality of special-status species. This impact would be considered significant.](#) Considering
24 Alternative 4's protection and restoration provisions, which would provide acreages of new or
25 enhanced habitat in amounts suitable to compensate for habitats lost to construction and
26 restoration activities, and with the implementation of AMM1-AMM7, and Mitigation Measure BIO-
27 125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the loss of habitat or
28 direct mortality through implementation of Alternative 4 would not result in a substantial adverse
29 effect through habitat modifications and would not substantially reduce the number or restrict the
30 range of mountain plover. Therefore, the loss of habitat or potential mortality under this alternative
31 would have a less-than-significant impact on mountain plover.

32 **Mitigation Measure BIO-125: Compensate for the Near-term Loss of Mountain Plover** 33 **Wintering Habitat**

34 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
35 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value
36 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland
37 protection, enhancement, and management may be substituted for the protection of high-value
38 cultivated lands.

39 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission** 40 **Facilities**

41 [New transmission lines would increase the risk for bird-power line strikes, which could result in](#)
42 [injury or mortality of mountain plover.](#) Mountain plovers congregate in flocks during the winter and
43 travel between grasslands and cultivated lands that provide foraging habitat for the species. This

1 flocking behavior puts them at risk of collisions with powerlines. ~~This flocking behavior puts them at~~
 2 ~~risk of collisions with powerlines. However, plovers exhibit low wing loading and high aspect-ratio~~
 3 ~~wings and as a result can maneuver relatively quickly around an obstacle such as a transmission~~
 4 ~~line. Their wing structure and design allows for rapid flight and quick, evasive actions. Marking~~
 5 ~~transmission lines with flight diverters that make the lines more visible to birds has been shown to~~
 6 ~~dramatically reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)~~
 7 ~~estimated that marking devices in the Central Valley could reduce avian mortality by 60%. Existing~~
 8 ~~transmission lines in the study area currently pose this risk.~~ Plovers are primarily visual foragers
 9 and therefore, the risk for collision would be further reduced by *AMM20 Greater Sandhill Crane*,
 10 which would require the installation of bird flight diverters on all new ~~and selected existing~~
 11 transmission lines in the study area.

12 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover
 13 because ~~the probability of bird-powerline strikes is highly unlikely due to their flight behaviors. The~~
 14 ~~implementation of *AMM20 Greater Sandhill Crane* which would require the installation of bird flight~~
 15 ~~diverters on all new transmission lines, which would further reduce any potential for mortality.~~
 16 ~~Therefore, the construction and operation of new transmission lines under Alternative 4 would not~~
 17 ~~result in an adverse effect on mountain plover. mortality from powerline strikes would be minimized~~
 18 ~~with the implementation of *AMM20 Greater Sandhill Crane*, which would require the installation of~~
 19 ~~bird flight diverters on new and selected existing transmission lines in the study area. The risk for~~
 20 ~~bird-power line strikes is, therefore, not expected to have an adverse effect on mountain plover.~~

21 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain
 22 plover because ~~the probability of bird-powerline strikes is highly unlikely due to their flight~~
 23 ~~behaviors. The implementation of *AMM20 Greater Sandhill Crane* which would require the~~
 24 ~~installation of bird flight diverters on all new transmission lines, which would further reduce any~~
 25 ~~potential for mortality. Therefore, the construction and operation of new transmission lines under~~
 26 ~~Alternative 4 would result in a less-than-significant impact on mountain plover. mortality from~~
 27 ~~powerline strikes would be minimized with the implementation of *AMM20 Greater Sandhill Crane*,~~
 28 ~~which would require the installation of bird flight diverters on new and selected existing~~
 29 ~~transmission lines in the study area.~~

30 **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

31 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
 32 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction
 33 noise above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the
 34 edge of construction activities (~~Draft BDCP~~ Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
 35 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4 ~~in Appendix D, *Substantive*~~
 36 ~~*BDCP Revisions, of this RDEIR/SEIS*~~), although there are no available data to determine the extent to
 37 which these noise levels could affect mountain plover. Indirect effects associated with construction
 38 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 39 disturbing operations. The use of mechanical equipment during water conveyance facilities
 40 construction could cause the accidental release of petroleum or other contaminants that could affect
 41 these species or their prey in the surrounding habitat. AMM1–AMM7 would minimize the likelihood
 42 of such spills from occurring. The inadvertent discharge of sediment or excessive dust adjacent to
 43 mountain plover ~~grassland-wintering~~ habitat could also have a negative effect on the species.
 44 However, AMM1–AMM7 would also ensure that measures would be in place to prevent runoff from
 45 the construction area and the negative effects of dust on wildlife adjacent to work areas.

1 **NEPA Effects:** Indirect effects on mountain plover as a result of Plan implementation could have
2 adverse effects on the species through the modification of habitat. With the With the
3 implementation of AMM1–AMM7, indirect effects as a result of Alternative 4 implementation would
4 not have an adverse effect mountain plover.

5 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Plan implementation could have
6 a significant impact on the species from modification of habitat. With the implementation of AMM1–
7 AMM7, indirect effects as a result of Alternative 4 implementation would have a less-than-significant
8 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 wintering habitat (Table 12-4-47). Based on hypothetical
14 footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration* could result in the
15 periodic inundation of up to approximately 3,823 acres of modeled mountain plover habitat (Table
16 12-4-47).

17 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
18 plover foraging habitat. However, effects of periodic inundation would not have an adverse effect on
19 mountain plover because birds would be expected to move to adjacent foraging habitat.

20 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
21 plover foraging habitat. However, effects of periodic inundation would have a less-than-significant
22 impact on mountain plover because birds would be expected to move to adjacent foraging habitat.

23 **Black Tern**

24 This section describes the effects of Alternative 4, including water conveyance facilities construction
25 and implementation of other conservation components, on black tern. Modeled nesting habitat for
26 black tern in the study area is currently limited to rice in CZ 2.

27 Construction and restoration associated with Alternative 4 conservation measures would result in
28 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-4-
29 48. Full implementation of Alternative 4 would include the following biological objectives over the
30 term of the BDCP which would also benefit the black tern ([BDCP-see Chapter 3, Section 3.3,](#)
31 *Biological Goals and Objectives* [of the Draft BDCP](#)).

- 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).

40 As explained below, with the restoration and protection of these amounts of habitat, in addition to
41 management activities that would enhance this habitat for the species and implementation of

1 AMM1–AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA
2 purposes and would be less than significant for CEQA purposes.

3 **Table 12-4-48. Changes in Black Tern Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	Nesting	76	260	0	0	791–1,582	0
Total Impacts CM2–CM18		76	260	0	0	791–1,582	0
TOTAL IMPACTS		76	260	0	0	791–1,582	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

4

5 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

6 Alternative 4 conservation measures would result in the permanent loss of up to 260 acres of
7 modeled nesting habitat for black tern, consisting of rice in CZ 2 (Table 12-4-48). Conservation
8 measures that would result in these losses are grassland restoration (CM8) and nontidal marsh
9 restoration (CM10). Each of these individual activities is described below. A summary statement of
10 the combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation
11 measure discussions.

- 12 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
13 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands
14 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in
15 the first 10 years.
- 16 • *CM10 Nontidal Marsh Restoration*: Implementation of *CM10* would result in the permanent
17 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be
18 removed in the first 10 years.
- 19 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
20 actions that are designed to enhance wildlife values in restored or protected habitats could
21 result in localized ground disturbances that could temporarily remove small amounts of
22 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road
23 and other infrastructure maintenance activities, would be expected to have minor adverse

1 effects on available habitat and would be expected to result in overall improvements to and
2 maintenance of habitat values over the term of the BDCP. Habitat management- and
3 enhancement-related activities could disturb nesting black terns if they were to nest in the
4 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual
5 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The
6 potential for these activities to result in direct mortality of black tern would be minimized with
7 the implementation of and Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird
8 Surveys and Avoid Disturbance of Nesting Birds.

- 9 ● Operations and Maintenance: Postconstruction operation and maintenance of the restoration
10 infrastructure could result in ongoing but periodic disturbances that could affect black tern
11 nesting adjacent to maintenance areas. Maintenance activities would include vegetation
12 management, levee and structure repair, and re-grading of roads and permanent work areas.
13 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and
14 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 black tern individuals if they were present in the study area,
17 because they would be expected to avoid contact with construction and other equipment. If
18 black tern were to nest in the construction area, construction-related activities, including
19 equipment operation, noise and visual disturbances could destroy nests or lead to their
20 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and
21 minimized with the implementation of Mitigation Measure BIO-75.
- 22 ● Late season flooding in the Yolo Bypass could result in the loss of rice (nesting habitat for black
23 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss
24 of rice in the bypass and results are provided in [BDCP Appendix 5.J, Attachment 5J.E, Estimation
25 of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass, of the Draft
26 BDCP](#). This analysis concludes that the estimated loss of rice could be up to 1,662 acres by the
27 late long-term timeframe. This potential impact is further described under Impact BIO-129c
28 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 ([see Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*](#)).
 3 These conservation actions are associated with CM3 and would occur in the same timeframe as the
 4 early restoration losses. The BDCP also contains objectives for the giant garter snake to protect at
 5 least 500 acres of rice in CZ 2 and to protect up to 1,700 acres of rice land or equivalent habitat in
 6 the Yolo Bypass (if this portion meets the criteria specified in CM3, *Reserve Design Requirements by*
 7 *Species* for giant garter snake, Objectives GGS2.3 and GGS 3.1) by the late long-term time period.
 8 These objectives would inform the near-term protection actions, and therefore some portion of the
 9 200 acres of rice and 700 acres of rice or equivalent habitat would be expected to be restored in CZ
 10 2. However, there is no near-term acreage commitment in the plan that is specific to CZ 2. In order to
 11 avoid an adverse effect on black tern from habitat loss, protection of 76 acres of rice would need to
 12 occur in CZ 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of*
 13 *Black Tern Nesting Habitat*, would be available to address this adverse 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 [Appendix 3.C, *Avoidance and Minimization Measures, of the Draft BDCP, and an*](#)
 21 [updated version of AMM6 is described in Appendix D, *Substantive BDCP Revisions, of this*](#)
 22 [RDEIR/SDEISBDCP Appendix 3.C, *Avoidance and Minimization Measures*](#). Black tern is not a covered
 23 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction
 24 surveys for noncovered avian species would be required to ensure that nests are detected and
 25 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 26 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

27 **Late Long-Term Timeframe**

28 Alternative 4 as a whole would result in the permanent loss of 260 acres of modeled black tern
 29 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ
 30 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 31 *Restoration* to protect 500 acres of rice lands ([see Table 3-4 in Chapter 3 *Description of Alternatives,*](#)
 32 [of this RDEIR/SDEIS](#)) and up to 1,700 acres of rice lands or equivalent habitat for the giant garter
 33 snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the northern part of the study
 34 area has largely been reduced to rice lands, and these acres would provide protected nesting habitat
 35 for the species.

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 CM7 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 [Appendix 3.C, *Avoidance and Minimization Measures, of the Draft BDCP, and an*](#)
 43 [updated version of AMM6 is described in Appendix D, *Substantive BDCP Revisions, of this*](#)
 44 [RDEIR/SDEISBDCP Appendix 3.C, *Avoidance and Minimization Measures*](#). Black tern is not a covered
 45 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction

1 surveys for noncovered avian species would be required to ensure that nests are detected and
2 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
3 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

4 **NEPA Effects:** The loss of black tern nesting habitat and potential mortality of this special-status
5 species under Alternative 4 would represent an adverse effect in the absence of other conservation
6 actions. However, with habitat protection associated with CM3, guided by biological goals and
7 objectives and by AMM1–AMM7, which would be in place ~~during all project activities throughout the~~
8 ~~construction period~~, the effects of habitat loss under Alternative 4 would not be adverse. Black tern
9 is not a covered species under the BDCP, and potential mortality would be an adverse effect without
10 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
11 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
12 available to address this effect.

13 **CEQA Conclusion:**

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 be less than significant under CEQA. There would be no impacts on
19 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).
20 However, there would be a loss of 76 acres of modeled nesting habitat for black tern in the study
21 area in the near-term. These effects would result from implementing *CM8 Grassland Natural*
22 *Community Restoration* and *CM10 Nontidal Marsh Restoration*.

23 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of
24 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be
25 protected in CZ 2 to mitigate the losses of black tern nesting habitat.

26 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
27 equivalent habitat (~~see~~ Table 3-4 in Chapter 3 *Description of Alternatives of this RDEIR/SDEIS*).
28 These conservation actions are associated with CM3 and would occur in the same timeframe as the
29 early restoration losses. The BDCP also contains objectives for the giant garter snake to protect at
30 least 500 acres of rice in CZ 2 and to protect up to 1,700 acres of rice land or equivalent habitat in
31 the Yolo Bypass (if this portion meets the criteria specified in CM3, *Reserve Design Requirements by*
32 *Species* for giant garter snake, Objectives GGS2.3 and GGS 3.1) by the late long-term time period.
33 These objectives would inform the near-term protection actions, and therefore some portion of the
34 200 acres of rice and 700 acres of rice or equivalent habitat would be expected to be restored in CZ
35 2. However, there is no near-term acreage commitment in the plan that is specific to CZ 2.

36 ~~Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, which would~~
37 ~~require 1:1 protection of habitat in CZ 2 in the near-term time frame would reduce this potential~~
38 ~~impact to a less-than-significant level.~~

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

1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are
2 described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
3 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
4 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

5 Black tern is not a covered species under the BDCP. For the BDCP to have a less-than-significant
6 impact on individuals, preconstruction would be required to ensure that nests are detected and
7 avoided. [In the absence of other conservation actions, effects on black tern would represent an](#)
8 [adverse effect as a result of habitat modification and potential for direct mortality of a special-status](#)
9 [species. This impact would be considered significant. However, the BDCP has committed to habitat](#)
10 [protection, restoration, management and enhancement activities described above. As outlined in](#)
11 [Draft BDCP Chapter 3, Section 3.4.4, Conservation Measures, natural community restoration and](#)
12 [protection are planned so that they keep pace with project impacts. and Thus, there would be](#)
13 [minimal lag time between impacts and those measures designed to offset those impacts on natural](#)
14 [communities and the species that use them. The natural community restoration and protection](#)
15 [activities would be concluded in the first 10 years of Plan implementation, which is close enough in](#)
16 [time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes. In addition,](#)
17 [implementation of AMM1-AMM7, Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird](#)
18 [Surveys and Avoid Disturbance of Nesting Birds, and Mitigation Measure BIO-129a, Compensate for](#)
19 [Loss of Black Tern Nesting Habitat, which would require 1:1 protection of habitat in CZ 2 in the near-](#)
20 [term time frame, would reduce this potential impact to a less-than-significant level.](#)

21 [Implementation of Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and](#)
22 [Avoid Disturbance of Nesting Birds, would reduce the potential impact on nesting black tern to a less-](#)
23 [than-significant level.](#)

24 **Late Long-Term Timeframe**

25 Alternative 4 as a whole would result in the permanent loss of 260 acres of modeled black tern
26 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ
27 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
28 *Restoration* to protect 500 acres of rice lands ([see Table 3-4 in Chapter 3 Description of Alternatives,](#)
29 [of this RDEIR/SDEIS](#)) and up to 1,700 acres of rice lands or equivalent habitat for the giant garter
30 snake (Objective GGS3.1) in CZ 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, and AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*
35 *Material.* All of these AMMs include elements that would avoid or minimize the risk of affecting
36 individuals and species habitats adjacent to work areas. The AMMs are described in detail in
37 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of](#)
38 [AMM6 is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS. BDCP Appendix](#)
39 [3.C, Avoidance and Minimization Measures.](#) Black tern is not a covered species under the BDCP. For
40 the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
41 species would be required to ensure that nests are detected and avoided. Implementation of
42 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
43 *Nesting Birds*, would [identify any nesting terns during preconstruction surveys and ensure that](#)
44 [active nests are avoided which would](#) reduce the potential impact on nesting black tern to a less-
45 than-significant level.

1 In the absence of other conservation actions, effects on black tern would represent an adverse effect
2 as a result of habitat modification and potential for direct mortality of special-status species. This
3 impact would be considered significant. Considering Alternative 4's habitat protection provisions,
4 which would provide acreages of new or enhanced habitat in amounts greater than necessary to
5 compensate for habitats lost to construction and restoration activities, loss of habitat or direct
6 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
7 through habitat modifications and would not substantially reduce the number or restrict the range
8 of the species. Therefore, the alternative would have a less-than-significant impact on black tern.

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 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

13 Because there is no near-term acreage commitment associated with the protection of rice in CZ
14 2, BDCP proponents must protect rice at a 1:1 ratio for each acre of rice impacted in CZ 2.

15 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

16 ~~Construction noise above background noise levels (greater than 50 dBA) could extend 500 to 5,250~~
17 ~~feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of*~~
18 ~~*the 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 black tern.~~ If black
20 terns were to nest in or adjacent to work areas, construction and subsequent maintenance-related
21 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce
22 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*
23 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the
24 potential for adverse effects of construction-related activities on survival and productivity of nesting
25 black terns. The use of mechanical equipment during restoration activities could cause the
26 accidental release of petroleum or other contaminants that could affect black terns in the
27 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable
28 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*
29 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
30 spills and ensure that measures are in place to prevent runoff from the construction area and
31 negative effects of dust on active nests.

32 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
33 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
34 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
35 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
36 2009). The effect of selenium toxicity differs widely between species and also between age and sex
37 classes within a species. In addition, the effect of selenium on a species can be confounded by
38 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
39 2009).

40 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
41 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
42 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 black tern. Marsh (tidal and
13 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase
14 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration
15 activities that create newly inundated areas could increase bioavailability of selenium (see [BDCP](#)
16 [Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration). Changes in selenium
17 concentrations were analyzed in Chapter 8, *Water Quality, of the Draft EIR/EIS* and it was
18 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
19 in substantial, long-term increases in selenium concentrations in water in the Delta under any
20 alternative. However, it is difficult to determine whether the effects of potential increases in
21 selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)
22 would lead to adverse effects on black tern.

23 Because of the uncertainty that exists at this programmatic level of review, there could be an effect
24 on black tern from increases in selenium associated with restoration activities. This effect would be
25 addressed through the implementation of *AMM27 Selenium Management* ([Appendix D, Substantive](#)
26 [BDCP Revisions, of this RDEIR/SDEIS](#)~~[BDCP Appendix 3.C, Avoidance and Minimization Measures](#)~~)
27 which would 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:** Noise and visual disturbances from the construction of conservation components
34 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical
35 equipment for the construction of conservation components could cause the accidental release of
36 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent
37 to suitable habitat. AMM1–AMM7 and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
38 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on
39 nesting individuals.

40 Tidal habitat restoration could result in increased exposure of black tern to selenium. This effect
41 would be addressed through the implementation of *AMM27 Selenium Management*, 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.

1 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components
2 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
3 mechanical equipment for the construction of conservation components could cause the accidental
4 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
5 adjacent to suitable habitat which could result in potential mortality of a special-status species.
6 These impacts would be significant. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct*
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these
8 impacts to a less-than–significant level.

9 Tidal habitat restoration could result in increased exposure of black tern to selenium, which could
10 result in the mortality of a special-status species. This impact would be significant. This effect would
11 be addressed through the implementation of *AMM27 Selenium Management*, which would provide
12 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
13 selenium and its bioavailability in tidal habitats. With AMM27 in place, potential effects of increased
14 exposure of black tern to selenium would be reduced to a less-than-significant impact.

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-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**
19 **Implementation of Conservation Components**

20 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat
21 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season
22 but could reduce the availability of nesting habitat during years that flooding extends into the
23 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to
24 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,
25 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo
26 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation
27 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are
28 provided in BDCP-Appendix 5.J, Attachment 5J.E, Estimation of BDCP Impact on Giant Garter Snake
29 Summer Foraging Habitat in the Yolo Bypass, of the Draft BDCP. This analysis concludes that the
30 estimated loss of rice could be up to 1,662 acres by the late long-term timeframe. The BDCP has
31 committed to protect, restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective
32 GGS3.1). These acres of rice would be protected in areas that are less susceptible to inundation,
33 which would benefit the black tern during years in which the magnitude and duration of inundation
34 were increased.

35 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for
36 black tern. However, if flooding were to extend into the nesting season or were to significantly
37 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect
38 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under
39 Objective GGS3.1 in the BDCP.

40 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on
41 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to
42 significantly reduce rice production it could also reduce suitable black tern nesting habitat. This

1 potential impact would be reduced to less than significant by the creation and/or protection of
2 1,700 acres of rice in CZ 2 under Objective GGS3.1 in the BDCP.

3 **California Horned Lark and Grasshopper Sparrow**

4 This section describes the effects of Alternative 4, including water conveyance facilities construction
5 and implementation of other conservation components, on California horned lark and grasshopper
6 sparrow. The primary impact of concern for grasshopper sparrow and California horned lark would
7 be the loss of breeding habitat in the Plan Area, which includes grassland vernal pool complex, and
8 alkali seasonal wetland natural communities and selected cultivated lands including grain and hay
9 crops and pasture. Construction and restoration associated with Alternative 4 conservation
10 measures would result in both temporary and permanent losses of modeled breeding habitat for
11 California horned lark and grasshopper sparrow as indicated in Table 12-4-49. Full implementation
12 of Alternative 4 would include the following biological objectives over the term of the BDCP which
13 would also benefit the California horned lark and the grasshopper sparrow (~~BDCP~~see Chapter 3,
14 Section 3.3, *Biological Goals and Objectives*, of the Draft BDCP).

- 15 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
16 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
17 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 18 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 19 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
20 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 21 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
22 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 23 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
24 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
25 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, 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 As explained below, with the restoration or protection of these amounts of habitat, in addition to
29 management activities that would enhance habitat for these species and implementation of AMM1-
30 AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow
31 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**
2 **Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	1,9699 67	1,9699 67	6335 03	6335 03	NA	NA
Total Impacts CM1		1,9699 67	1,9699 67	6335 03	6335 03	NA	NA
CM2-CM18	Breeding	5,450	26,198	376	893	1,158-3,650	3,823
Total Impacts CM2-CM18		5,450	26,198	376	893	1,158-3,650	3,823
TOTAL IMPACTS		7,4194 17	28,167 165	1,009 879	1,526 396	1,158-3,650	3,823

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**
5 **Lark and Grasshopper Sparrow**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 29,693-561 acres of modeled nesting habitat for California horned lark and grasshopper
8 sparrow (of which 28,167-165 acres would be a permanent loss and 1,526-396 acres would be a
9 temporary loss of habitat, Table 12-4-49). Conservation measures that would result in these losses
10 are conveyance facilities and transmission line construction, and establishment and use of reusable
11 tunnel material borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal
12 habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland
13 restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10),
14 and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 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 California horned lark and grasshopper 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 follow the individual conservation measure
22 discussions.

- 1 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
2 facilities would result in the combined permanent and temporary loss of up to 2,602-470 acres
3 of modeled California horned lark and grasshopper sparrow habitat (1,969-967 acres of
4 permanent loss, 633-503 acres of temporary loss). Impacts would occur from the construction of
5 Intakes 2, 3, and 5 and associated temporary work areas and access roads in CZ 4 between
6 Clarksburg and Courtland; the rerouting of Highway 160; construction of the intermediate
7 forebay; and from a reusable tunnel material storage area on Bouldin Island. The construction of
8 the permanent and temporary transmission line corridors through CZs 4-6 and 9 would also
9 remove suitable foraging habitat for the species. Approximately 796 acres of impact would be
10 from the placement of reusable tunnel material area west of the Clifton Court Forebay in CZ 8. In
11 addition, permanent habitat loss would occur from the construction of the new forebay south of
12 the existing Clifton court Forebay in CZ 8. Impacts would occur from the construction of intakes
13 2, 3, and 5 and associated temporary work areas and access roads in CZ 4 between Clarksburg
14 and Courtland. The construction of the permanent and temporary transmission line corridors
15 through CZs 4-6 and 9 would also remove suitable nesting habitat. Approximately 685 acres of
16 impact would be from the new forebay constructed south of the Clifton Court Forebay in CZ 8.
17 Some of the grassland habitat lost at the sites of new canals south of Clifton Court Forebay is
18 composed of larger stands of ruderal and herbaceous vegetation and California annual
19 grassland, which is also suitable nesting habitat for the species. Grasshopper sparrows were
20 detected in DHCCP surveys south of Byron Highway in CZ 8 (1 occurrence) and east of Intakes 2
21 and 3 (6 occurrences), in the Stone Lakes NWR. However, the CM1 footprint does not overlap
22 with any grasshopper sparrow or California horned lark occurrences. Mitigation Measure BIO-
23 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
24 require preconstruction surveys and the establishment of no-disturbance buffers and would be
25 available to address adverse effects on nesting California horned larks or grasshopper sparrows.
26 Refer to the Terrestrial Biology Map ~~B~~ book in Appendix A of this RDEIR/SDEIS for a detailed
27 view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-
28 14 years of Plan implementation.
- 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 1,274 acres of modeled
31 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres
32 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
33 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
34 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
35 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
36 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
37 years of Alternative 4 implementation.
- 38 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
39 inundation would permanently remove an estimated 20,880 acres of modeled California horned
40 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated
41 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache
42 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and
43 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
44 directly impact and fragment grassland just north of Rio Vista in and around French and
45 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
46 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
47 the northern fringes of Suisun Marsh.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
2 seasonally inundated floodplain would permanently and temporarily remove approximately
3 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933
4 permanent, 517 temporary). These losses would be expected after the first 10 years of
5 Alternative 4 implementation along the San Joaquin River and other major waterways in CZ 7.
- 6 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
7 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as
8 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 9 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
10 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
11 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
12 would be restored after the construction periods. Grassland restoration would be implemented
13 on agricultural lands that also provide nesting habitat for California horned lark and
14 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to
15 grassland.
- 16 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
17 removal of 705 acres of California horned lark and grasshopper sparrow nesting habitat.
- 18 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
19 actions included in CM11 that are designed to enhance wildlife values in restored or protected
20 habitats could result in localized ground disturbances that could temporarily remove small
21 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
22 vegetation and road and other infrastructure maintenance activities, would be expected to have
23 minor adverse effects on available habitat and would be expected to result in overall
24 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would
25 also include the construction of recreational-related facilities including trails, interpretive signs,
26 and picnic tables ([BDCP-see Chapter 4, Covered Activities and Associated Federal Actions, of the](#)
27 [Draft BDCP](#)). The construction of trailhead facilities, signs, staging areas, picnic areas,
28 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
29 However, approximately 50 acres of grassland habitat would be lost from the construction of
30 trails and facilities.
- 31 Habitat management- and enhancement-related activities could disturb California horned lark
32 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,
33 equipment operation could destroy nests, and noise and visual disturbances could lead to their
34 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*
35 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
36 to address these adverse effects.
- 37 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
38 modeled California horned lark and grasshopper sparrow habitat for the development of a delta
39 and longfin smelt conservation hatchery in CZ 1.
- 40 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
41 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
42 disturbances that could affect California horned lark and grasshopper sparrow use of the
43 surrounding habitat. Maintenance activities would include vegetation management, levee and
44 structure repair, and re-grading of roads and permanent work areas. These effects, however,

1 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as
2 described below.

- 3 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
4 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were
5 present in the Plan Area, because they would be expected to avoid contact with construction and
6 other equipment. If either species were to nest in the construction area, construction-related
7 activities, including equipment operation, noise and visual disturbances could destroy nests or
8 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
9 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. Alternative 4 would remove 8,428-296
18 acres (7,419-417 permanent, 1,009-879 temporary) of modeled breeding habitat for California
19 horned lark and grasshopper sparrow in the study area in the near-term. These effects would result
20 from the construction of the water conveyance facilities (CM1, 2,602-470 acres), and implementing
21 other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural*
22 *Communities Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural*
23 *Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11*
24 *Natural Communities Enhancement and Management, and CM18 Conservation Hatcheries—5,826*
25 *acres*).

26 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
27 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,2044,940 acres should
28 be protected to compensate for the CM1 losses of 2,602-470 acres of California horned lark and
29 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
30 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
31 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
32 (2:1 for protection).

33 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
34 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
35 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
36 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are
37 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
38 early restoration losses thereby avoiding adverse effects of habitat loss on California horned lark
39 and grasshopper sparrow. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8,
40 and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
41 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
42 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
43 pool natural communities which would expand breeding habitat for California horned lark and
44 grasshopper sparrow and reduce the effects of current levels of habitat fragmentation. Under *CM11*

1 *Natural Communities Enhancement and Management*, insect prey populations would be increased on
 2 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 3 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
 4 species would provide approximately 15,400 acres of potential nesting habitat for California horned
 5 lark and grasshopper sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands
 6 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
 7 and high-value crop types for Swainson’s hawk (Objective SH1.2) which would also provide
 8 potential nesting habitat for California horned lark and grasshopper sparrow. This biological
 9 objective provides an estimate for the high proportion of cultivated lands protected in the near-term
 10 time period which would provide nesting habitat for California horned lark and grasshopper
 11 sparrow.

12 The acres of restoration and protection contained in the near-term Plan goals and the additional
 13 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
 14 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-
 15 term effects of the other conservation measures with the consideration that some portion of the
 16 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable
 17 crop types to compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-130,
 18 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*
 19 would be available to address the adverse effect of habitat loss in the near-term.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 27 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 28 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

29 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
 30 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
 31 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
 32 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 33 available to address this adverse effect.

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

35 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692-561
 36 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the
 37 Plan. The locations of these losses are described above in the analyses of individual conservation
 38 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 39 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 40 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 41 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 42 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 43 for native wildlife species ([see Table 3-4 in Chapter 3, Description of Alternative, of this](#)
 44 [RDEIR/SDEIS](#)). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
 45 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with

1 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
 2 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
 3 communities which would expand breeding habitat for California horned lark and grasshopper
 4 sparrow and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
 5 *Communities Enhancement and Management*, insect prey populations would be increased on
 6 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 7 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
 8 species would provide approximately 15,400 acres of potential nesting habitat for California horned
 9 lark and grasshopper sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands
 10 protected would be in alfalfa and pasture crop types. These are very high- and high-value crop types
 11 for Swainson's hawk (Objective SH1.2) and would provide potential nesting habitat for California
 12 horned lark and grasshopper sparrow.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 20 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 21 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures](#). California horned lark and
 22 grasshopper sparrow are not 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 adverse effect.

27 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential
 28 mortality of these special-status species under Alternative 4 would represent an adverse effect in
 29 the absence of other conservation actions. However, with habitat protection and restoration
 30 associated with CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–
 31 AMM7, which would be in place ~~during all project activities throughout the construction period~~, and
 32 with implementation of Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of*
 33 *California Horned Lark and Grasshopper Sparrow Habitat*, the effects of habitat loss on California
 34 horned lark and grasshopper sparrow under Alternative 4 would not be adverse. California horned
 35 lark and grasshopper sparrow are not covered species under the BDCP, and potential mortality
 36 would be an adverse effect without preconstruction surveys to ensure that nests are detected and
 37 avoided. Mitigation Measure BIO-75 would be available to 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. Alternative 4 would remove 8,428
 44 [296](#) acres (7,419-417 permanent, 1,009-879 temporary) of modeled breeding habitat for California

1 horned lark and grasshopper sparrow in the study area in the near-term. These effects would result
 2 from the construction of the water conveyance facilities (CM1, 2, ~~602-470~~ acres), and implementing
 3 other conservation measures (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural
 4 Communities Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural
 5 Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11
 6 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826
 7 acres).

8 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
 9 would be 2:1 for protection of habitat. Using this ratio would indicate that ~~5,2044,940~~ acres should
 10 be protected to mitigate the CM1 losses of ~~2,602-470~~ acres of California horned lark and
 11 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
 12 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
 13 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
 14 (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 (see Table
 18 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are
 19 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
 20 early restoration losses thereby avoiding significant impacts on California horned lark and
 21 grasshopper sparrow. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
 22 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with
 23 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
 24 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
 25 communities which would expand breeding habitat for California horned lark and grasshopper
 26 sparrow and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
 27 *Communities Enhancement and Management*, insect prey populations would be increased on
 28 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 29 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
 30 species would provide approximately 15,400 acres of potential nesting habitat for California horned
 31 lark and grasshopper sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands
 32 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
 33 and high-value crop types for Swainson’s hawk (Objective SH1.2) which would also provide
 34 potential nesting habitat for California horned lark and grasshopper sparrow. This biological
 35 objective provides an estimate for the high proportion of cultivated lands protected in the near-term
 36 time period which would provide nesting habitat for California horned lark and grasshopper
 37 sparrow.

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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
 45 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
 46 RDEIR/SDEIS. BDCP Appendix 3.C, Avoidance and Minimization Measures.

1 In the absence of other conservation actions, the effects on California horned lark and grasshopper
 2 sparrow habitat would represent an adverse effect as a result of habitat modification and potential
 3 direct mortality of special-status species. This impact would be significant. California horned lark
 4 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. The acres of restoration and protection
 7 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
 8 typical mitigation that would be applied to the project-level effects of CM1 on California horned lark
 9 and grasshopper sparrow, as well as mitigate the near-term effects of the other conservation
 10 measures with the consideration that some portion of the 15,400 acres of cultivated lands protected
 11 in the near-term timeframe would be managed in suitable crop types to compensate for the loss of
 12 habitat at a ratio of 2:1. With the acres of habitat protection and restoration described above, in
 13 addition to AMM1-7, and implementation of Mitigation Measure BIO-75, Conduct Preconstruction
 14 Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, and Mitigation Measure BIO-130,
 15 Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat,
 16 Alternative 4 would not result in a substantial adverse effect through habitat modification and
 17 would not substantially reduce the number or restrict the range of either species. Therefore,
 18 Alternative 4 would have a would reduce the impact of habitat loss in the near-term to a less-than-
 19 significant level; impact on California horned lark and grasshopper sparrow.

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 ~~California horned lark and grasshopper sparrow are not covered species under the BDCP. For the~~
 28 ~~BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian~~
 29 ~~species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-~~
 30 ~~75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would~~
 31 ~~reduce this potential impact to a less-than-significant level.~~

32 **Late Long-Term Timeframe**

33 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692
 34 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the
 35 Plan. The locations of these losses are described above in the analyses of individual conservation
 36 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 37 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 38 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 39 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 40 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 41 for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives, of this*
 42 *RDEIR/SDEIS*). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
 43 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with
 44 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
 45 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural

1 communities which would expand breeding habitat for California horned lark and grasshopper
2 sparrow and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
3 *Communities Enhancement and Management*, insect prey populations would be increased on
4 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
5 VPNC2.5, and GNC2.4).

6 Cultivated lands that provide habitat for covered and other native wildlife species would provide
7 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
8 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in
9 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective
10 SH1.2) which would also provide potential nesting habitat for California horned lark and
11 grasshopper sparrow. 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 [Appendix 3.C, Avoidance and Minimization](#)
18 [Measures, of the Draft BDCP, and an updated version of AMM6 is described in Appendix D,](#)
19 [Substantive BDCP Revisions, of this RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization](#)
20 [Measures](#). California horned lark and grasshopper sparrow are not covered species under the BDCP.
21 For the BDCP to avoid impacts on individuals, preconstruction surveys for noncovered avian species
22 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
23 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce
24 this impact to a less-than-significant level.

25 [In the absence of other conservation actions, the effects on California horned lark and grasshopper](#)
26 [sparrow habitat would represent an adverse effect as a result of habitat modification and potential](#)
27 [direct mortality of special-status species. This impact would be significant.](#) Considering Alternative
28 4's protection and restoration provisions, which would provide acreages of new high-value or
29 enhanced habitat in amounts suitable to compensate for habitats lost to construction and
30 restoration activities, and with the implementation of AMM1-AMM7, Mitigation Measure BIO-75,
31 and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and*
32 *Grasshopper Sparrow Habitat*, the loss of habitat or direct mortality through implementation of
33 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
34 would not substantially reduce the number or restrict the range of either species. Therefore, the loss
35 of habitat or potential mortality under this alternative would have a less-than-significant impact on
36 California horned lark and grasshopper sparrow.

37 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
38 **Disturbance of Nesting Birds**

39 See Mitigation Measure BIO-75 under Impact BIO-75.

40 **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**
41 **Lark and Grasshopper Sparrow Habitat**

42 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
43 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 by installing flight-diverters on new and selected
9 existing powerlines.

10 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
11 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
12 implementation of *AMM20 Greater Sandhill Crane*, the effect of new transmission lines on California
13 horned lark and grasshopper sparrow would not be adverse.

14 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
15 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
16 incorporation of *AMM20 Greater Sandhill Crane*, new transmission lines would have a less-than-
17 significant impact on grasshopper sparrow and California horned lark.

18 **Impact BIO-132: Indirect Effects of Plan Implementation on California Horned Lark and**
19 **Grasshopper Sparrow**

20 Noise and visual disturbances associated with construction-related activities could result in
21 temporary disturbances that affect California horned lark and grasshopper sparrow use of modeled
22 habitat. Construction noise above background noise levels (greater than 50 dBA) could extend 500
23 to 5,250 feet from the edge of construction activities (~~Draft BDCP~~ Appendix 5.J, Attachment 5J.D,
24 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4 [in](#)
25 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS](#)), although there are no available data to
26 determine the extent to which these noise levels could affect California horned lark or grasshopper
27 sparrow. Indirect effects associated with construction include noise, dust, and visual disturbance
28 caused by grading, filling, contouring, and other ground-disturbing operations. Construction-related
29 noise and visual disturbances could disrupt nesting and foraging behaviors, and reduce the
30 functions of suitable habitat which could result in an adverse effect on these species. Mitigation
31 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
32 *Birds*, would be available to minimize adverse effects on active nests. The use of mechanical
33 equipment during water conveyance construction could cause the accidental release of petroleum or
34 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1–
35 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
36 the likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to
37 California horned lark and grasshopper sparrow nesting habitat could also have a negative effect on
38 these species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
39 construction area and the negative effects of dust on wildlife adjacent to work areas.

40 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of
41 Alternative 4 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 potential 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 4 implementation could have a significant impact on these species. The incorporation of
6 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 12-4-49).

17 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
18 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled
19 habitat (Table 12-4-49).

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 and inundation.

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 4, including water conveyance facilities construction
31 and implementation of other conservation components, on least bittern and white-faced ibis.
32 Modeled breeding habitat for least bittern and white-faced ibis includes tidal freshwater, nontidal
33 freshwater emergent wetlands, managed wetlands, and other natural seasonal wetlands in CZ 2, 4,
34 and 11. Construction and restoration associated with Alternative 4 conservation measures would
35 result in both temporary and permanent losses of modeled habitat for mountain plover as indicated
36 in Table 12-4-50. Full implementation of Alternative 4 would include the following biological
37 objectives over the term of the BDCP which would also benefit least bittern and white-faced ibis
38 ([BDCP-see](#) Chapter 3, Section 3.3, *Biological Goals and Objectives*, [of the Draft BDCP](#)).

- 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 12-4-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	Yolo	Floodplain
CM1	Nesting	1	1	45	45	NA	NA
Total Impacts CM1		1	1	45	45	NA	NA
CM2–CM18	Nesting	5,134	13,063	45	45	961–2,672	NA
Total Impacts CM2–CM18		5,134	13,063	45	45	961–2,672	NA
TOTAL IMPACTS		5,135	13,064	4647	4647	961–2,672	NA

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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. 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

Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and White-Faced Ibis

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 13,113-111 acres of modeled habitat for least bittern and white-faced ibis (13,064 acres of permanent loss and ~~4947~~ of temporary loss, Table 12-4-50). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of ~~reusable tunnel material borrow and spoil~~ areas (CM1), Yolo Bypass fisheries improvements (CM2), and tidal habitat 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-

1 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
2 or eliminate least bittern and white-faced ibis habitat. Each of these individual activities is described
3 below. A summary statement of the combined impacts, NEPA effects, and a CEQA conclusion follow
4 the individual conservation measure discussions.

- 5 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
6 facilities would result in the combined permanent and temporary loss of up to 5 acres of
7 modeled least bittern and white-faced ibis habitat (1 acre of permanent loss, 4-5 acres of
8 temporary loss) from CZ 4. Permanent impacts on habitat would occur from a reusable tunnel
9 material storage site north of Twin Cities Road and east of the Intermediate Forebay. Temporary
10 impacts would occur from the construction of two temporary transmission lines one extending
11 east along Lambert Road from the Lambert Road Vent Shaft, and one extending south from the
12 Lambert Road Vent Shaft to the Intermediate Forebay. The construction footprint for CM1 does
13 not overlap with any occurrences of least bittern or white-faced ibis. However, Mitigation
14 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
15 *Birds*, would be available to minimize effects on least bittern and white-faced ibis if they were to
16 nest in the vicinity of the construction footprint. Refer to the Terrestrial Biology Map Book in
17 Appendix A of this RDEIR/SDEIS for a detailed view of Alternative 4 construction locations.
18 Impacts from CM1 would occur within the first 10-14 years of Plan implementation.
- 19 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
20 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the
21 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is
22 expected to occur during the first 10 years of Alternative 4 implementation.
- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
24 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and
25 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 26 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
27 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
28 to enhance wildlife values in restored or protected habitats could result in localized ground
29 disturbances that could temporarily remove small amounts of least bittern and white-faced ibis
30 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
31 other infrastructure maintenance activities, would be expected to have minor adverse effects on
32 available least bittern and white-faced ibis habitat.
- 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 least bittern and white-faced ibis 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 AMM1-AMM7. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
39 *Avoid Disturbance of Nesting Birds*, would be available to further reduce effects.
- 40 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
41 direct mortality of least bittern and white-faced ibis because adults and fledged young would be
42 expected to avoid contact with construction and other equipment. However, if either species
43 were to nest in the construction area, equipment operation, noise and visual disturbances could
44 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.
45 Construction-related activities could also flush least bittern adults from nests and lead to

1 [collision with man-made objects \(Sterling 2008\). Mitigation Measure BIO-75 would require](#)
2 [preconstruction surveys in and adjacent to work areas and, if nests were present, no](#)
3 [disturbance buffers would be implemented. Mitigation Measure BIO-75 would be available to](#)
4 [address these adverse effects.](#)

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 also
7 included.

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 or restoration in an appropriate timeframe to ensure that the
12 effects of construction would not be adverse under NEPA. Alternative 4 would remove 5,184-182
13 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-term
14 (5,135 acres of permanent loss, and 49-47 acres of temporary loss). These effects would result from
15 the construction of the water conveyance facilities (CM1, 5-6 acres), and the implementation of other
16 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]
17 5,179 acres).

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
19 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
20 these ratios would indicate that 5-6 acres of habitat should be restored and 5-6 acres of habitat
21 should be protected to compensate for the CM1 losses of 5 acres of least bittern and white-faced ibis
22 habitat. The near-term effects of other conservation actions would remove 5,179 acres of modeled
23 habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of least
24 bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for
25 restoration and 1:1 for protection).

26 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
27 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area ([see Table](#)
28 [3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*](#)). These conservation actions are
29 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
30 restoration losses, thereby avoiding adverse effects of habitat loss on least bittern and white-faced
31 ibis. The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7
32 (Objective TFEWNC1.1 in [BDCP Chapter 3, *Conservation Strategy, of the Draft EIR/EIS*](#)) and would be
33 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
34 among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed wetland would be
35 protected and enhanced in CZ 11 and would benefit these species through the enhancement of
36 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
37 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
38 American bulrush plant associations (Objective MWNC1.1). In addition, at least 400 acres of nontidal
39 marsh would be created, some of which would provide nesting habitat for least bittern and white-
40 faced ibis. These Plan objectives represent performance standards for considering the effectiveness
41 of restoration and protection actions. The acres of restoration and protection contained in the near-
42 term Plan goals satisfy the typical mitigation that would be applied to the project-level effects of
43 CM1, as well as mitigate the near-term effects of the other conservation measures.

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 avoid or*
 6 *minimize the risk of affecting individuals and species habitats adjacent to work areas and storage*
 7 *sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of](#)*
 8 *[the Draft BDCP, and an updated version of AMM6 is described in Appendix D, Substantive BDCP](#)*
 9 *[Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#) Least*
 10 *bittern and white-faced ibis are not covered species under the BDCP. For the BDCP to avoid an*
 11 *adverse effect on individuals, preconstruction surveys for noncovered avian species would be*
 12 *required to ensure that nests are detected and avoided.*

13 **Late Long-Term Timeframe**

14 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 13, ~~113~~ 111
 15 acres (13,064 acres of permanent loss, ~~49-47~~ acres of temporary loss) of least bittern and white-
 16 faced ibis habitat during the term of the Plan. The locations of these losses are described above in
 17 the analyses of individual conservation measures. The Plan includes conservation commitments
 18 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
 19 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
 20 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
 21 of managed wetland would be protected and enhanced in CZ 11.

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 [Appendix 3.C, Avoidance and Minimization Measures, of](#)*
 29 *[the Draft BDCP, and an updated version of AMM6 is described in Appendix D, Substantive BDCP](#)*
 30 *[Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#) Least*
 31 *bittern and white-faced ibis are not covered species under the BDCP. For the BDCP to avoid an*
 32 *adverse effect on individuals, preconstruction surveys for noncovered avian species would be*
 33 *required to ensure that nests are detected and avoided.*

34 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these
 35 special-status species under Alternative 4 would represent an adverse effect in the absence of other
 36 conservation actions. However, with the habitat protection and restoration associated with CM3,
 37 CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
 38 would be in place ~~during all project activities throughout the construction period~~, the effects of
 39 habitat loss under Alternative 4 on least bittern and white-faced ibis would not be adverse. Least
 40 bittern and white-faced ibis are not covered species under the BDCP, and the potential for mortality
 41 would be an adverse effect without preconstruction surveys to ensure that nests are detected and
 42 avoided. Mitigation Measure BIO-75 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 impacts of construction would be less than significant under CEQA. Alternative 4 would remove
7 ~~5,184-182~~ acres of modeled habitat for least bittern and white-faced ibis in the study area in the
8 near-term (5, ~~135-135~~ acres of permanent loss, and ~~49-47~~ acres of temporary loss). These effects
9 would result from the construction of the water conveyance facilities (CM1, ~~5-6~~ acres), and the
10 implementation of other conservation measures (Yolo Bypass fisheries enhancement [CM2], and
11 tidal restoration [CM4] 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 ~~5-6~~ acres of habitat should be restored and ~~5-6~~ acres of habitat
15 should be protected to mitigate the CM1 losses of ~~5-6~~ acres of least bittern and white-faced ibis
16 habitat. The near-term effects of other conservation actions would remove 5,179 acres of modeled
17 habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of least
18 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 (see Table 3-4 in Chapter 3,
22 *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with
23 CM4 and CM3 and would occur in the same timeframe as the construction and early restoration
24 losses, thereby avoiding adverse effects of habitat loss on least bittern and white-faced ibis. The tidal
25 freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1
26 in *BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP*) and would be restored in a way that
27 creates topographic heterogeneity and in areas that increase connectivity among protected lands
28 (Objective TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in
29 CZ 11 and would benefit these species through the enhancement of degraded areas (such as areas of
30 bare ground or marsh where the predominant vegetation consists of invasive species such as
31 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
32 associations (Objective MWNC1.1). In addition, at least 400 acres of nontidal marsh would be
33 created, some of which would provide nesting habitat for least bittern and white-faced ibis. These
34 Plan objectives represent performance standards for considering the effectiveness of restoration
35 and protection actions.

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 avoid or
41 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage
42 sites. The AMMs are described in detail in Appendix 3.C, Avoidance and Minimization Measures, of
43 the Draft BDCP, and an updated version of AMM6 is described in Appendix D, Substantive BDCP
44 Revisions, of this RDEIR/SDEIS BDCP Appendix 3.C, Avoidance and Minimization Measures.

1 In the absence of other conservation actions, the effects on least bittern and white-faced ibis habitat
2 would represent an adverse effect as a result of habitat modification and potential direct mortality
3 of special-status species. This impact would be significant. Least bittern and white-faced ibis are not
4 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
5 preconstruction surveys for noncovered avian species would be required to ensure that nests are
6 detected and avoided. The acres of restoration and protection contained in the near-term Plan goals
7 satisfy the typical mitigation that would be applied to the project-level effects of CM1, as well as
8 mitigate the near-term effects of the other conservation measures. With the acres of habitat
9 protection and restoration described above, in addition to AMM1-7, and implementation of
10 Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of
11 Nesting Birds, Alternative 4 would not result in a substantial adverse effect through habitat
12 modification and would not substantially reduce the number or restrict the range of either species.
13 Therefore, Alternative 4 would have a less-than-significant impact on least bittern and white-faced
14 ibis.

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 avoid or~~
20 ~~minimize the risk of affecting individuals and species habitats adjacent to work areas and storage~~
21 ~~sites. The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization~~
22 ~~Measures. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP~~
23 ~~to have a less-than-significant impact on individuals, preconstruction surveys would be required to~~
24 ~~ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,~~
25 ~~Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce~~
26 ~~the potential impact on nesting least bittern and white-faced ibis to a less-than-significant level.~~

27 **Late Long-Term Timeframe**

28 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 13, ~~113~~ 111
29 acres (13,064 acres of permanent loss, ~~49-47~~ acres of temporary loss) of least bittern and white-
30 faced ibis habitat during the term of the Plan. The locations of these losses are described above in
31 the analyses of individual conservation measures. The Plan includes conservation commitments
32 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
33 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
34 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
35 of managed wetland would be protected and enhanced in CZ 11.

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 avoid or
41 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage
42 sites. The AMMs are described in detail in Appendix 3.C, Avoidance and Minimization Measures, of
43 the Draft BDCP, and an updated version of AMM6 is described in Appendix D, Substantive BDCP
44 Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures. Least
45 bittern and white-faced ibis are not covered species under the BDCP. For the BDCP to have a less

1 than adverse effect on individuals, preconstruction surveys for noncovered avian species would be
2 required to ensure that nests were detected and avoided. Implementation of Mitigation Measure
3 BIO-75 would reduce the potential impact on nesting least bittern and white-faced ibis and to a less-
4 than-significant level.

5 In the absence of other conservation actions, the effects on least bittern and white-faced ibis habitat
6 would represent an adverse effect as a result of habitat modification and potential direct mortality
7 of special-status species. This impact would be significant. Least bittern and white-faced ibis are not
8 covered species under the BDCP. Considering Alternative 4's protection and restoration provisions,
9 which would provide acreages of new high-value or enhanced habitat in amounts suitable to
10 compensate for habitats lost to construction and restoration activities, and with the implementation
11 of AMM1–AMM7 and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
12 *Avoid Disturbance of Nesting Birds*, the loss of habitat or direct mortality through implementation of
13 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
14 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
15 habitat or potential mortality under this alternative would have a less-than-significant impact on
16 least bittern and white-faced ibis.

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-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical**
21 **Transmission Facilities**

22 New transmission lines would increase the risk for bird-power line strikes, which could result in
23 injury or mortality of least bittern and white-faced ibis. Waterbirds have a higher susceptibility to
24 collisions than passerines, raptors, and other birds. Bitterns and ibises have a high wing loading/low
25 aspect ratio which limits their maneuverability and make them more vulnerable to collisions rather
26 than more agile species (see Draft BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird*
27 *Collisions at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make
28 the lines more visible to birds has been shown to dramatically reduce the incidence of bird mortality
29 (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could
30 reduce avian mortality by 60%. All new project transmission lines would be fitted with flight
31 diverters which would reduce bird strike risk of least bittern and white-faced ibis.~~The risk for bird-~~
32 ~~power line strikes would be minimized with the incorporation of AMM20 Greater Sandhill Crane into~~
33 ~~the BDCP. This measure would ensure that conductor and ground lines are fitted with flight~~
34 ~~diverters in compliance with the best available practices, such as those specified in the USFWS Avian~~
35 ~~Protection Guidelines.~~

36 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
37 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
38 high wing loading/low aspect ratio which limits their maneuverability and make them more
39 vulnerable to collisions rather than more agile species. The implementation of AMM20 Greater
40 Sandhill Crane would require the installation of bird flight diverters on all new transmission lines,
41 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
42 of bird flight diverters, the construction and operation of new transmission lines under Alternative 4
43 would not result in an adverse effect on least bittern and white-faced ibis.~~With the incorporation of~~

1 ~~AMM20 Greater Sandhill Crane into the BDCP, new transmission lines would not have an adverse~~
2 ~~effect on least bittern and white faced ibis.~~

3 **CEQA Conclusion:** 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. Bitterns and ibises have a
5 high wing loading/low aspect ratio which limits their maneuverability and make them more
6 vulnerable to collisions rather than more agile species. The implementation of AMM20 Greater
7 Sandhill Crane would require the installation of bird flight diverters on all new transmission lines,
8 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
9 of bird flight diverters, the construction and operation of new transmission lines under Alternative 4
10 would result in a less-than-significant impact on least bittern and white-faced ibis.~~With the~~
11 ~~incorporation of AMM20 Greater Sandhill Crane into the BDCP, new transmission lines would have a~~
12 ~~less-than-significant impact on least bittern and white-faced ibis.~~

13 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced** 14 **Ibis**

15 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated
16 with construction-related activities could result in temporary disturbances that affect least bittern
17 and white-faced ibis use of modeled habitat. Construction noise above background noise levels
18 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (Draft
19 BDCP-Appendix 5.J, Attachment 5J.D, Indirect Effects of the Construction of the BDCP Conveyance
20 Facility on Sandhill Crane, Table 4 in Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS),
21 although there are no available data to determine the extent to which these noise levels could affect
22 least bittern or white-faced ibis. Indirect effects associated with construction include noise, dust,
23 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
24 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
25 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
26 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
27 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
28 of mechanical equipment during water conveyance construction could cause the accidental release
29 of petroleum or other contaminants that could adversely affect these species or their prey in the
30 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
31 *Monitoring*, would minimize the likelihood of such spills from occurring. ~~The inadvertent discharge~~
32 ~~of sediment or excessive dust adjacent to least bittern and white faced ibis could also have a~~
33 ~~negative effect on these species. AMM1–AMM7 would and would~~ ensure that measures are/were in
34 place to prevent runoff from the construction area and the negative effects of dust on wildlife
35 adjacent to work areas.

36 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
37 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
38 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
39 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
40 newly inundated areas could increase bioavailability of mercury (see BDCP-Chapter 3, Conservation
41 Strategy, of the Draft BDCP for details of restoration). Species sensitivity to methylmercury differs
42 widely and there is a large amount of uncertainty with respect to species-specific effects. A detailed
43 review of the methylmercury issues associated with implementation of the BDCP areis contained in
44 Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS. Appendix XD which~~The review~~
45 includes an overview of the BDCP-related mechanisms that could result in increased mercury in the

1 food web, and how exposure to individual species may occur based on feeding habits and where
2 their habitat overlaps with the areas where mercury bioavailability could increase. Increased
3 methylmercury associated with natural community and floodplain restoration could indirectly affect
4 least bittern and white-faced ibis, via uptake in lower trophic levels (as described in Appendix D,
5 Substantive BDCP Revisions, in this RDEIR/SDEIS~~the BDCP, Appendix 5.D, Contaminants~~).

6 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
7 into the foodweb, CM12 Methylmercury Management (as revised in Appendix D, Substantive BDCP
8 Revisions, in this RDEIR/SDEIS); is included to provide for site-specific evaluation for each
9 restoration project. On a project-specific basis, where high potential for methylmercury production
10 is identified that restoration design and adaptive management cannot fully address while also
11 meeting restoration objectives, alternate restoration areas will~~would~~ be considered. CM-12
12 will~~would~~ be implemented in coordination with other similar efforts to address mercury in the
13 Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This conservation
14 measure will~~would~~ include the following actions.

- 15 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
16 mercury methylation and bioavailability
- 17 ● Define design elements that minimize conditions conducive to generation of methylmercury in
18 restored areas.
- 19 ● Define adaptive management strategies that can be implemented to monitor and minimize
20 actual postrestoration creation and mobilization of methylmercury.

21 ~~In addition, the potential mobilization or creation of methylmercury within the Plan Area varies~~
22 ~~with site-specific conditions and would need to be assessed at the project level. CM12 Methylmercury~~
23 ~~Management contains provisions for project-specific Mercury Management Plans. Site-specific~~
24 ~~restoration plans that address the creation and mobilization of mercury, as well as monitoring and~~
25 ~~adaptive management as described in CM12 would be available to address the uncertainty of~~
26 ~~methylmercury levels in restored tidal marsh and potential impacts on least bittern and white-faced~~
27 ~~ibis.~~

28 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
29 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
30 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
31 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
32 2009). The effect of selenium toxicity differs widely between species and also between age and sex
33 classes within a species. In addition, the effect of selenium on a species can be confounded by
34 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
35 2009).

36 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
37 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
38 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
39 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
40 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
41 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
42 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
43 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
44 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which

1 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic
2 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
3 levels of selenium have a higher risk of selenium toxicity.

4 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
5 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
6 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced
7 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,
8 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.
9 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
10 selenium (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details of restoration).
11 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, [of the Draft EIR/EIS](#)
12 and it was determined that, relative to Existing Conditions and the No Action Alternative, CM1
13 would not result in substantial, long-term increases in selenium concentrations in water in the Delta
14 under any alternative. However, it is difficult to determine whether the effects of potential increases
15 in selenium bioavailability associated with restoration-related conservation measures (CM4 and
16 CM5) would lead to adverse effects on least bittern and white-faced ibis.

17 Because of the uncertainty that exists at this programmatic level of review, there could be a
18 substantial effect on least bittern and white-faced ibis from increases in selenium associated with
19 restoration activities. This effect would be addressed through the implementation of *AMM27*
20 *Selenium Management* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)
21 [Appendix 3.C, Avoidance and Minimization Measures](#)) which would provide specific tidal habitat
22 restoration design elements to reduce the potential for bioaccumulation of selenium and its
23 bioavailability in tidal habitats. Furthermore, the effectiveness of selenium management to reduce
24 selenium concentrations and/or bioaccumulation would be evaluated separately for each
25 restoration effort as part of design and implementation. This avoidance and minimization measure
26 would be implemented as part of the tidal habitat restoration design schedule.

27 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the
28 water conveyance facilities could have adverse effects on these species in the absence of other
29 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this
30 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
31 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of
32 construction on active nests. Tidal habitat restoration could result in increased exposure of least
33 bittern and white-faced ibis to selenium. This effect would be addressed through the
34 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
35 restoration design elements to reduce the potential for bioaccumulation of selenium and its
36 bioavailability in tidal habitats.

37 Increased methylmercury associated with natural community and floodplain restoration could
38 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in
39 [the BDCP, Appendix 5.D, Contaminants, of the Draft BDCP](#)). 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. [Implementation of CM12 which contains](#)
42 [measures to assess the amount of mercury before project development, followed by appropriate](#)
43 [design and adaptation management, would minimize the potential for increased methylmercury](#)
44 [exposure, and would result in no adverse effect on least bittern and white-faced ibis.](#) *CM12*
45 [Methylmercury Management contains provisions for project-specific Mercury Management Plans.](#)

1 ~~Site-specific restoration plans that address the creation and mobilization of mercury, as well as~~
2 ~~monitoring and adaptive management as described in CM12 would better inform potential adverse~~
3 ~~effects and address the uncertainty of methylmercury levels in restored tidal marsh in the study~~
4 ~~area. The site-specific planning phase of marsh restoration would be the appropriate place to assess~~
5 ~~the potential for risk of methylmercury exposure for least bittern and white-faced ibis, once site~~
6 ~~specific sampling and other information could be developed.~~

7 **CEQA Conclusion:** Indirect effects ~~of noise and visual disturbance, in addition to the potential for~~
8 ~~hazardous spills or increased dust~~ on least bittern and white-faced ibis ~~and their habitat~~ as a result
9 of ~~constructing the water conveyance facilities~~ plan implementation would represent a substantial
10 adverse effect in the absence of other conservation actions. This impact would be significant. ~~could~~
11 have a significant impact on these species. The incorporation of AMM1–AMM7 into the BDCP and
12 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
13 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.
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*). In addition, the potential mobilization or creation of~~
17 ~~methylmercury within the Plan Area varies with site-specific conditions and would need to be~~
18 ~~assessed at the project level. *CM12 Methylmercury Management* contains provisions for project-~~
19 ~~specific Mercury Management Plans. Tidal habitat restoration could result in increased exposure of~~
20 ~~least bittern and white-faced ibis to selenium. This effect would be addressed through the~~
21 ~~implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat~~
22 ~~restoration design elements to reduce the potential for bioaccumulation of selenium and its~~
23 ~~bioavailability in tidal habitats. Tidal habitat restoration could result in increased exposure of least~~
24 bittern and white-faced ibis to selenium. This effect would be addressed through the
25 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
26 restoration design elements to reduce the potential for bioaccumulation of selenium and its
27 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or
28 floodplain restoration could result in increased exposure of least bittern and white-faced ibis to
29 methylmercury in restored tidal areas. However, it is unknown what concentrations of
30 methylmercury are harmful to these species and the potential for increased exposure varies
31 substantially within the study area. Implementation of CM12 which contains measures to assess the
32 amount of mercury before project development, followed by appropriate design and adaptation
33 management, would minimize the potential for increased methylmercury exposure, and would
34 result in no adverse effect on least bittern and white-faced ibis.

35 Indirect effects of plan implementation would represent an adverse effect on least bittern and
36 white-faced ibis in the absence of other conservation measures. This would be a significant impact.
37 With AMM1-7, *AMM27 Selenium Management*, and CM12 in place, and with the implementation of
38 Mitigation Measure BIO-75, indirect effects of plan implementation would not result in a substantial
39 adverse effect through habitat modifications and would not substantially reduce the number or
40 restrict the range of either species. Therefore, the indirect effects of Alternative 4 plan
41 implementation would have a less-than-significant ~~not have a significant~~ impact on least bittern and
42 white-faced ibis.

43 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
44 **Disturbance of Nesting Birds**

45 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 12-4-50). However, no
6 adverse effects of increased inundation frequency on nesting habitat would be expected because
7 wetland vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to
8 frequency and inundation are within the tolerance of these vegetation types. Inundation would
9 occur in the nonbreeding season and wetlands supporting habitat would not be expected to be
10 affected by flood 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 4, including water conveyance facilities construction
21 and implementation of other conservation components, on loggerhead shrike. Modeled habitat for
22 loggerhead shrike includes both high-value and low-value modeled habitat. High-value habitat
23 includes grassland, vernal pool complex and alkali seasonal wetland natural communities in
24 addition to cultivated lands, including pasture and grain and hay crops. Breeding shrikes require
25 shrubs and tall trees for perching and nest placement, and are generally associated with riparian
26 edge grasslands (Humble 2008) or cultivated lands with associated trees and shrubs. Loggerhead
27 shrike modeled habitat is overestimated as it does not differentiate between lands with or without
28 associated nesting vegetation. Low-value habitat includes row crops such as truck and berry crops
29 and field crops which are not considered to be valuable habitat for the species but were included in
30 the model as they may provide foraging opportunities.

31 Construction and restoration associated with Alternative 4 conservation measures would result in
32 both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in
33 Table 12-4-51. Full implementation of Alternative 4 would include the following biological
34 objectives over the term of the BDCP which would also benefit loggerhead shrike (BDCP see Chapter
35 3, Section 3.3, *Biological Goals and Objectives, of the Draft BDCP*).

- 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).
- 40 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
41 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).

- 1 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
2 VPNC2.5, and GNC2.4, associated with CM11).
- 3 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
4 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 5 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
6 lands that occur in cultivated lands within the reserve system, including isolated valley oak
7 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
8 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
9 with CM3 and CM11).
- 10 ● Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
11 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
12 with CM11).
- 13 ● associated with Environmental Commitment 3, Environmental Commitment 7, and
14 Environmental Commitment 11.

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 Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for
18 NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	1,9699 <u>67</u>	1,9699 <u>67</u>	63350 <u>3</u>	6335 <u>03</u>	NA	NA
	Low-value	2,2741 <u>379</u>	2,2741 <u>379</u>	57561 <u>0</u>	5756 <u>10</u>	NA	NA
Total Impacts CM1		4,2433 .346	4,2433 .346	1,208 113	1,208 113	NA	NA
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
Total Impacts CM2–CM18		7,251	43,723 773	474	1,517	1,830–5,646	8,138
Total High-value		7,4194 17	28,167 165	1,009 879	1,526 396		
Total Low-value		4,0753 .180	19,188 48954	67270 7	1,199 1,234		
TOTAL IMPACTS		11,494 10,597	4847,0 15119	1,682 586	2,407 630	1,830–5,646	8,138

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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. 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-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**
5 **Loggerhead Shrike**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to ~~50,42249,749~~ acres of modeled habitat for loggerhead shrike (of which ~~29,693,561~~ acres is
8 of high-value and ~~21,04720,188~~ acres is of low value, Table 12-4-51). Conservation measures that
9 would result in these losses are conveyance facilities and transmission line construction, and
10 establishment and use of ~~reusable tunnel material borrow and spoil~~ areas (CM1), Yolo Bypass
11 fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5),
12 channel margin enhancement (CM6), riparian restoration, (CM7), grassland restoration (CM8),
13 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), natural
14 communities enhancement and management (CM11) and construction of conservation hatcheries
15 (CM18). The majority of habitat loss (33,244 acres) would result from CM4. Habitat enhancement

1 and management activities (CM11), which include ground disturbance or removal of nonnative
2 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
3 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
4 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
5 loggerhead shrike modeled habitat. Each of these individual activities is described below. A
6 summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the
7 individual conservation measure discussions.

- 8 ● CM1 Water Facilities Construction and Operation: Construction of Alternative 4 conveyance
9 facilities would result in the combined permanent and temporary loss of up to 2,602-470 acres
10 of high-value loggerhead shrike habitat (1,969-967 acres of permanent loss, 633-503 acres of
11 temporary loss). In addition, 2,849-1,989 acres of low-value habitat would be removed (1,379
12 2,274-acres of permanent loss, 575-610 acres of temporary loss). Impacts would occur from the
13 construction of Intakes 2, 3, and 5 and associated temporary work areas and access roads in CZ
14 4 between Clarksburg and Courtland; the rerouting of Highway 160; construction of the
15 intermediate forebay; and from a reusable tunnel material storage area on Bouldin Island. The
16 construction of the permanent and temporary transmission line corridors through CZs 4-6 and 9
17 would also remove suitable foraging habitat for the species. Approximately 796 acres of impact
18 would be from the placement of reusable tunnel material area west of the Clifton Court Forebay
19 in CZ 8. In addition, permanent habitat loss would occur from the construction of the new
20 forebay south of the existing Clifton court Forebay in CZ 8. Temporarily affected areas
21 (grassland, cultivated lands, and associated shrubs or trees) would be restored within 1 year
22 following completion of construction activities as described in AMM10 Restoration of
23 Temporarily Affected Natural Communities.

~~24 Impacts would occur from the construction of intakes 2, 3, and 5 and associated temporary work
25 areas and access roads in CZ 4 between Clarksburg and Courtland. The construction of the
26 permanent and temporary transmission line corridors through CZs 4-6 and 9 would also remove
27 suitable nesting habitat. The largest impact from CM1 on loggerhead shrike would occur in CZ 8,
28 where there are larger stands of ruderal and herbaceous vegetation and California annual
29 grassland, which provides high-value habitat for the species. Approximately 685 acres of impact
30 would be from the new forebay constructed south of the Clifton Court Forebay in CZ 8.~~

31 Loggerhead shrikes nest in high abundance in shrubs associated with these grasslands to the
32 south and to the west of Clifton Court Forebay. Shrikes were detected using this area at a much
33 higher rate than other grasslands and areas in the Delta during DHCCP surveys (Appendix 12C,
34 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report, of the Draft
35 EIR/EIS). Impacts from CM1 that overlap with recorded loggerhead shrike nest occurrences
36 (from CNDDDB and DHCCP surveys) include the construction of the new forebay (4-5
37 occurrences), the Reusable Tunnel Material storage area north-west of the existing forebay (1-2
38 occurrences), and the temporary canal work area north of Byron highway (1 occurrence). The
39 footprint for the permanent transmission line temporary transmission lines also intersects with
40 one loggerhead shrike occurrence just south of Clifton Court Road and to the north
41 west of the RTM storage area, east of Byron existing Clifton Court Forebay (1 occurrence), a permanent-
42 transmission line that extends along the northern extent of the Reusable Tunnel Material
43 storage areas west of the existing forebay (1 occurrence). Mitigation Measure BIO-75 Conduct
44 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would require
45 preconstruction surveys and the establishment of no-disturbance buffers and would be
46 available to address adverse effects on nesting loggerhead shrikes. Refer to the Terrestrial
47 Biology Map Book in Appendix A of this RDEIR/SDEIS for a detailed view of Alternative 4

- 1 construction locations. Impacts from CM1 would occur within the first 10-14 years of Plan
2 implementation.
- 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 high-value
5 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo
6 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of
7 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10
8 years of Alternative 4 implementation.
 - 9 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
10 inundation would permanently remove an estimated 20,880 acres of high-value loggerhead
11 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would
12 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the
13 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of
14 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal
15 restoration would directly impact and fragment grassland just north of Rio Vista in and around
16 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses
17 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo
18 Bypass and on the northern fringes of Suisun Marsh.
 - 19 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
20 seasonally inundated floodplain would permanently and temporarily remove approximately
21 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These
22 losses would be expected after the first 10 years of Alternative 4 implementation along the San
23 Joaquin River and other major waterways in CZ 7.
 - 24 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
25 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and
26 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat
27 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of
28 seasonal floodplain restoration through CM7.
 - 29 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
30 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
31 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
32 would be restored after the construction periods. Grassland restoration would be implemented
33 on agricultural lands that also provide habitat for loggerhead shrike and would result in the
34 conversion of 1,849 acres of cultivated lands to high-value grassland.
 - 35 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
36 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value
37 loggerhead shrike 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 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. [Fences \(e.g.](#)

1 barbed wire) installed as part of Environmental Commitment 11, in or adjacent to protected
2 grasslands and cultivated lands could benefit loggerhead shrike by providing hunting perches
3 and impalement opportunities. CM11 would also include the construction of recreational-
4 related facilities including trails, interpretive signs, and picnic tables (~~BDCP~~Chapter 4, *Covered*
5 *Activities and Associated Federal Actions, of the Draft BDCP*). The construction of trailhead
6 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
7 disturbed areas when and where possible. However, approximately 50 acres of grassland
8 habitat would be lost from the construction of trails and facilities.

9 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.
10 If either species were to nest in the vicinity of a worksite, equipment operation could destroy
11 nests if shrubs and trees in grasslands or cultivated lands were removed, and noise and visual
12 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings.
13 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
14 *of Nesting Birds*, would be available to address these adverse effects.

- 15 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
16 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation
17 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan
18 implementation.
- 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 loggerhead shrike 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 Mitigation Measure BIO-75, and conservation actions as described below.
- 25 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
26 direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,
27 because they would be expected to avoid contact with construction and other equipment. If
28 either species were to nest in the construction area, construction-related activities, including
29 equipment operation, noise and visual disturbances could destroy nests or lead to their
30 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
31 available to address these potential effects.

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. Alternative 4 would remove 8,428-296
40 acres (7,419-417 permanent, 1,009-879 temporary) of high-value habitat for loggerhead shrike in the
41 study area in the near-term. These effects would result from the construction of the water
42 conveyance facilities (CM1, 2,602-470 acres), and implementing other conservation measures (CM2
43 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally*
44 *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 *5,826 acres). In addition, 7,5833,887 acres of low-value habitat would be removed or converted in*
4 *the near-term (CM1, 2,8491,989 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural*
5 *Communities Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural*
6 *Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11*
7 *Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—1,898*
8 *acres).*

9 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
10 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 5,2044,940 acres
11 should be protected to compensate for the loss of high-value habitat from CM1. The near-term
12 effects of other conservation actions would require 11,652 acres of protection to compensate for the
13 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
14 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
15 large proportion of the low-value habitat would result from the conversion and enhancement to
16 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
17 quickly after completion of construction.

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, and protecting 15,400 acres of non-rice cultivated lands (see Table
21 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are
22 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
23 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 CZ 1, 8, and 11 would be associated with vernal pool and alkali
26 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
27 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
28 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the
29 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
30 *and Management*, insect prey populations would be increased on protected lands, enhancing the
31 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
32 Cultivated lands that provide habitat for covered and other native wildlife species would provide
33 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). The BDCP has committed to near-term goals
39 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
40 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
41 late-successional habitat types with a well-developed understory of dense shrubs. AMM18
42 Swainson's Hawk includes a measure to plant large mature trees, including transplanting trees
43 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
44 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
45 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
46 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable

1 [nesting habitat for loggerhead shrike](#). These Plan objectives represent performance standards for
2 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 and other near-term effects on loggerhead shrike high-value habitat with the consideration
7 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe
8 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the
9 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such
10 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. Mitigation
11 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*
12 would be available to address the adverse effect of near-term high-value habitat loss. With the
13 management and enhancement of cultivated lands including insect prey enhancement through CM3
14 and CM11, the protection of shrubs and establishment of hedgerows within protected cultivated
15 lands would compensate for any potential effect from the loss of low-value loggerhead shrike
16 foraging 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*, 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
24 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
25 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures](#).

26 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse
27 effect on individuals, preconstruction surveys for noncovered avian species would be required to
28 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
29 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
30 adverse effect.

31 **Late Long-Term Timeframe**

32 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692-561
33 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 21,04720,188
34 acres of low-value loggerhead shrike habitat would be impacted. The locations of these losses are
35 described above in the analyses of individual conservation measures. The Plan includes
36 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM8*
37 *Grassland Natural Community Restoration*, [CM7 Riparian Natural Community Restoration](#), and *CM9*
38 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore
39 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150
40 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide
41 suitable habitat for native wildlife species (see Table 3-4 in Chapter 3 [Description of Alternatives, of](#)
42 [this RDEIR/SDEIS](#)). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
43 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with
44 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would

1 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
 2 communities which would create larger, more expansive patches of high-value habitat for
 3 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*
 4 *Natural Communities Enhancement and Management*, insect prey populations would be increased on
 5 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 6 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
 7 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead
 8 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to
 9 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain
 10 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide
 11 hedgerows along field borders and roadsides within protected cultivated lands would also provide
 12 high-value nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to
 13 near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural
 14 community. Riparian areas would be restored, maintained, and enhanced to provide a mix of early-,
 15 mid- and late-successional habitat types with a well-developed understory of dense shrubs. AMM18
 16 Swainson's Hawk includes a measure to plant large mature trees, including transplanting trees
 17 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
 18 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
 19 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
 20 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
 21 nesting habitat for loggerhead shrike.

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-AMM10 Restoration of Temporarily Affected Natural Communities Barge*
 27 *Operations Plan*. All of these AMMs include elements that would avoid or minimize the risk of
 28 affecting individuals and species habitats adjacent to work areas. The AMMs are described in detail
 29 in *Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of*
 30 *AMM6 is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix*
 31 *3.C, Avoidance and Minimization Measures*. The loggerhead shrike is not a covered species under the
 32 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
 33 noncovered avian species would be required to ensure that nests are detected and avoided.
 34 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 35 *Nesting Birds*, would be available to address this adverse effect.

36 **NEPA Effects:** The loss of loggerhead shrike habitat and potential mortality of this special-status
 37 species under Alternative 4 would represent an adverse effect in the absence of other conservation
 38 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and
 39 CM11, guided by biological goals and objectives and by AMM1–*AMM7-AMM6, AMM10 Restoration of*
 40 *Temporarily Affected Natural Communities, and AMM18 Swainson's Hawk*, and with implementation
 41 of Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike*
 42 *Habitat*, which would be available to guide the near-term protection and management of cultivated
 43 lands, the effects of habitat loss on loggerhead shrike under Alternative 4 would not be adverse.
 44 Loggerhead shrike is not a covered species under the BDCP, and potential mortality would be an
 45 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.

1 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
2 *Nesting Birds*, would be available to address this 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. Alternative 4 would remove 8,428
9 296 acres (7,419-417 permanent, 1,009-879 temporary) of high-value habitat for loggerhead shrike
10 in the study area in the near-term. These effects would result from the construction of the water
11 conveyance facilities (CM1, 2,602-470 acres), and implementing other conservation measures (CM2
12 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian*
13 *Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and*
14 *Alkali Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and*
15 *Management* and CM18 *Conservation Hatcheries*—5,826 acres). In addition, 7,5837,887 acres of low-
16 value habitat would be removed or converted in the near-term (CM1, 2,8491,989 acres; CM2 *Yolo*
17 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural*
18 *Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali*
19 *Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management*
20 and CM18 *Conservation Hatcheries*—1,898 acres).

21 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
22 would be 2:1 protection of high-value habitat. Using these typical ratios would indicate that
23 5,2044,940 acres should be protected to compensate for the loss of high-value habitat from CM1.
24 The near-term effects of other conservation actions would require 11,652 acres of protection to
25 compensate for the loss of high-value shrike habitat using the same typical NEPA and CEQA ratio
26 (2:1 protection for the loss of high-value habitat). The loss of low-value habitat would not require
27 mitigation because a large proportion of the low-value habitat would result from the conversion and
28 enhancement to high-value habitats. In addition, temporary impacts on cultivated lands would be
29 restored relatively quickly after completion of construction.

30 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
31 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
32 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
33 3-4 in Chapter 3 *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are
34 associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and
35 early restoration losses.

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 CZs 1, 8, and 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 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce
41 the effects of current levels of habitat fragmentation. Under CM11 *Natural Communities*
42 *Enhancement and Management*, insect prey populations would be increased on protected lands,
43 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
44 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would

1 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
2 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
3 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
4 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
5 along field borders and roadsides within protected cultivated lands would also provide high-value
6 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
7 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
8 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
9 late-successional habitat types with a well-developed understory of dense shrubs. AMM18
10 Swainson's Hawk includes a measure to plant large mature trees, including transplanting trees
11 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
12 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
13 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
14 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
15 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
16 considering the effectiveness of conservation actions.

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 AMM10 Restoration of Temporarily Affected Natural Communities. All of these AMMs
22 include elements that would avoid or minimize the risk of affecting individuals and species habitats
23 adjacent to work areas. The AMMs are described in detail in Appendix 3.C, Avoidance and
24 Minimization Measures, of the Draft BDCP, and an updated version of AMM6 is described in
25 Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEISBDCP Appendix 3.C, Avoidance and
26 Minimization Measures.

27 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
28 represent an adverse effect as a result of habitat modification and potential direct mortality of a
29 special-status species. This impact would be significant. Loggerhead shrike is not a covered species
30 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
31 noncovered avian species would be required to ensure that nests are detected and avoided. The
32 combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex, and
33 alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
34 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
35 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration
36 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe
37 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the
38 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such
39 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. With the
40 acres of habitat protection and restoration described above, in addition to Mitigation Measure BIO-
41 138, Compensate for the Near-term Loss of High-Value Loggerhead Shrike Habitat , Alternative 4
42 would not result in a substantial adverse effect through loss of high-value habitat. The management
43 and enhancement of cultivated lands including insect prey enhancement through CM3 and CM11,
44 the protection of shrubs and establishment of hedgerows within protected cultivated lands would
45 compensate for any potential substantial impact from the loss of low-value loggerhead shrike
46 foraging habitat. In addition, AMM1-AMM7, and implementation of Mitigation Measure BIO-75,

1 Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would avoid
2 potentially significant impacts on nesting individuals. The implementation of Mitigation Measure
3 BIO-138, *Compensate for the Near-term Loss of High-Value Loggerhead Shrike Habitat*. With these
4 measures in place, Alternative 4 would not result in a substantial adverse effect through habitat
5 modification and would not substantially reduce the number or restrict the range of either species.
6 Therefore, Alternative 4 would have a less-than-significant impact on California horned lark and
7 grasshopper sparrow.

8 ~~would reduce the impact of near-term high-value habitat loss to a less-than-significant level. With~~
9 ~~the management and enhancement of cultivated lands including insect prey enhancement through~~
10 ~~CM3 and CM11, the protection of shrubs and establishment of hedgerows within protected~~
11 ~~cultivated lands would compensate for any potential impact from the loss of low-value loggerhead~~
12 ~~shrike foraging habitat.~~

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*.~~

20 ~~The loggerhead shrike is not a covered species under the BDCP and in order to avoid an adverse~~
21 ~~effect on individuals, preconstruction surveys for noncovered avian species would be required to~~
22 ~~ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct*~~
23 ~~*Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this~~
24 ~~potential impact to a less-than-significant level.~~

25 **Late Long-Term Timeframe**

26 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692,561
27 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 21,047,201,188
28 acres of low-value loggerhead shrike habitat would be impacted. The locations of these losses are
29 described above in the analyses of individual conservation measures. The Plan includes
30 conservation commitments through CM3 Natural Communities Protection and Restoration, CM8
31 Grassland Natural Community Restoration, and CM9 Vernal Pool and Alkali Seasonal Wetland Complex
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 and protect
34 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species (see Table 3-
35 4 in Chapter 3 *Description of Alternatives, of this RDEIR/SDEIS*). Grassland restoration and
36 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
37 protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
38 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
39 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,
40 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current
41 levels of habitat fragmentation. Under CM11 Natural Communities Enhancement and Management,
42 insect prey populations would be increased on protected lands, enhancing the foraging value of
43 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that
44 provide habitat for covered and other native wildlife species would provide approximately 48,625
45 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is

1 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and
2 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the
3 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides
4 within protected cultivated lands would also provide high-value nesting habitat for loggerhead
5 shrike (Objective SH2.2). The BDCP has committed to near-term goals of protecting 750 acres and
6 restoring 800 acres of valley/foothill riparian natural community. Riparian areas would be restored,
7 maintained, and enhanced to provide a mix of early-, mid- and late-successional habitat types with a
8 well-developed understory of dense shrubs. AMM18 Swainson's Hawk includes a measure to plant
9 large mature trees, including transplanting trees scheduled for removal. Trees would be planted in
10 areas that support high-value Swainson's hawk foraging habitat within or adjacent to conserved
11 cultivated lands, or as a component of the riparian restoration where they are in close proximity to
12 suitable foraging habitat. Locating tree plantings and riparian restoration adjacent to Swainson's
13 hawk foraging habitat would also provide suitable nesting habitat for loggerhead shrike.

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 AMM10 Restoration of Temporarily Affected Natural Communities AMM7 Barge*
19 *Operations Plan. All of these AMMs include elements that would avoid or minimize the risk of*
20 *affecting individuals and species habitats adjacent to work areas. The AMMs are described in detail*
21 *in Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of*
22 *AMM6 is described in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix*
23 *3.C, Avoidance and Minimization Measures. The loggerhead shrike is not a covered species under the*
24 *BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for*
25 *noncovered avian species would be required to ensure that nests are detected and avoided.*
26 *Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
27 *Nesting Birds, would reduce this potential impact to a less-than-significant level.*

28 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
29 represent an adverse effect as a result of habitat modification and potential direct mortality of a
30 special-status species. This impact would be significant. Considering Alternative 4's protection and
31 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
32 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
33 the implementation of AMM1-AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
34 *Bird Surveys and Avoid Disturbance of Nesting Birds,* and Mitigation Measure BIO-138, *Compensate*
35 *for the Near-Term Loss of High-Value Loggerhead Shrike Habitat,* the loss of habitat or direct
36 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
37 through habitat modifications and would not substantially reduce the number or restrict the range
38 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
39 a less-than-significant impact on loggerhead shrike.

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-138: Compensate for the Near-Term Loss of High-Value**
2 **Loggerhead Shrike Habitat**

3 Because the BDCP does not include acreage commitments for the protection of crop types in the
4 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as
5 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the
6 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
7 2:1. Additional grassland protection, enhancement, and management may be substituted for the
8 protection of high-value cultivated lands.

9 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**
10 **Facilities**

11 Loggerhead shrike's small, relatively maneuverable body; it's lack of flocking behavior, and it's
12 diurnal foraging behavior, contribute to a low risk of collision with the proposed transmission lines.
13 Marking transmission lines with flight diverters that make the lines more visible to birds has been
14 shown to dramatically reduce the incidence of bird mortality (Brown and Drewien 1995). For
15 example, Yee (2008) estimated that marking devices in the Central Valley could reduce avian
16 mortality by 60%. As described in AMM20 Greater Sandhill Crane, all new project transmission lines
17 would be fitted with flight diverters which would substantially reduce any potential for mortality of
18 loggerhead shrike individuals from powerline collisions.

19 ~~New transmission lines would increase the risk for bird power line strikes, which could result in~~
20 ~~injury or mortality of loggerhead shrike. The risk for bird power line strikes, would be minimized~~
21 ~~for lesser sandhill crane with the incorporation of AMM20 Greater Sandhill Crane into the BDCP. This~~
22 ~~measure would ensure that conductor and ground lines are fitted with flight diverters in compliance~~
23 ~~with the best available practices, such as those specified in the USFWS Avian Protection Guidelines~~
24 ~~and would further ensure no adverse effect from electrical transmission facilities.~~

25 ~~**NEPA Effects:** Loggerhead shrike's small, relatively maneuverable body; it's lack of flocking~~
26 ~~behavior, and it's diurnal foraging behavior, contribute to a low risk of collision with the proposed~~
27 ~~transmission lines In addition, AMM20 Greater Sandhill Crane contains the commitment to place bird~~
28 ~~strike diverters on all new transmission lines, which would substantially reduce the risk of bird~~
29 ~~strike for loggerhead shrike from the project. Therefore, the construction and operation of new~~
30 ~~transmission lines under Alternative 4 would not result in an adverse effect on loggerhead~~
31 ~~shrike.~~~~New transmission lines would increase the risk for bird power line strikes, which could result~~
32 ~~in injury or mortality of loggerhead shrike. With the implementation of AMM20 Greater Sandhill~~
33 ~~Crane the effect of new transmission lines on loggerhead shrike would not be adverse.~~

34 ~~**CEQA Conclusion:** Loggerhead shrike's small, relatively maneuverable body; it's lack of flocking~~
35 ~~behavior, and it's diurnal foraging behavior, contribute to a low risk of collision with the proposed~~
36 ~~transmission lines In addition, AMM20 Greater Sandhill Crane contains the commitment to place bird~~
37 ~~strike diverters on all new transmission lines, which would substantially reduce the risk of bird~~
38 ~~strike for loggerhead shrike from the project. Therefore, the construction and operation of new~~
39 ~~transmission lines under Alternative 4 would result in a less-than-significant impact on loggerhead~~
40 ~~shrike.~~~~New transmission lines would increase the risk for bird power line strikes, which could result~~
41 ~~in injury or mortality of loggerhead shrike. With the incorporation of AMM20 Greater Sandhill Crane~~
42 ~~into the BDCP, new transmission lines would have a less than significant impact on loggerhead~~
43 ~~shrike.~~

1 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

2 Noise and visual disturbances associated with construction-related activities could result in
 3 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise
 4 above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge
 5 of construction activities (Draft BDCP-Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
 6 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4 in Appendix D, Substantive
 7 BDCP Revisions, of this RDEIR/SEIS), although there are no available data to determine the extent to
 8 which these noise levels could affect loggerhead shrike. Indirect effects associated with construction
 9 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 10 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
 11 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
 12 effect on these species. Indirect effects from construction of the new forebay in CZ 8 could result in
 13 substantial effects on active loggerhead shrike nests. DHCCP surveys in 2009 detected 10 nest sites
 14 south-west of the Clifton Court Forebay (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
 15 *EIR/EIS Environmental Data Report, of the Draft EIR/EIS*) and the large expanses of grassland in CZ 8
 16 provide high-value nesting habitat for the species. Mitigation Measure BIO-75, *Conduct*
 17 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 18 minimize adverse effects on active nests. The use of mechanical equipment during water conveyance
 19 facilities construction could cause the accidental release of petroleum or other contaminants that
 20 could affect these species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2*
 21 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
 22 spills. The inadvertent discharge of sediment or excessive dust adjacent to loggerhead shrike nesting
 23 habitat could also have a negative effect on these species. AMM1–AMM7 would ensure that
 24 measures are in place to prevent runoff from the construction area and the negative effects of dust
 25 on wildlife adjacent to work areas.

26 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Alternative 4 implementation could
 27 have adverse effects on these species through the modification of habitat and potential for direct
 28 mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting
 29 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to
 30 work areas. The loggerhead shrike is not a covered species under the BDCP, and the potential for
 31 mortality would be an adverse effect without preconstruction surveys to ensure that nests are
 32 detected and avoided. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct*
 33 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 34 address this adverse effect.

35 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 4 implementation
 36 could have a significant impact on these species. Construction of the new forebay in CZ 8 would have
 37 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton
 38 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and
 39 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 40 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

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 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**
2 **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 1,830–
5 5,646 acres of modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of
6 high-value habitat; Table 12-4-51). Based on hypothetical footprints, implementation of *CM5*
7 *Seasonally Inundated Floodplain Restoration* could result in the periodic inundation of up to
8 approximately 8,138 acres of modeled habitat (Table 12-4-51), consisting of 3,823 acres of high-
9 value and 4,315 acres of low-value habitat.

10 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
11 season due to periodic inundation. However, increased frequency and duration of inundation would
12 occur during the nonbreeding season.

13 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead
14 shrike from the modification of habitat. Reduced foraging habitat availability may be expected
15 during the fledgling period of the nesting season due to periodic inundation. However, increased
16 frequency and duration of inundation would occur during the nonbreeding season.

17 **CEQA Conclusion:** Periodic inundation of floodplains would result in a less-than-significant impact
18 on loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be
19 expected during the fledgling period of the nesting season due to periodic inundation. However,
20 increased frequency and duration of inundation would occur during the nonbreeding season.

21 **Song Sparrow “Modesto” Population**

22 This section describes the effects of Alternative 4, including water conveyance facilities construction
23 and implementation of other conservation components, on Modesto song sparrow. The Modesto
24 song sparrow is common and ubiquitous throughout the Plan area, excluding CZ 11, and modeled
25 habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal freshwater
26 emergent, and valley/foothill riparian vegetation communities.

27 Construction and restoration associated with Alternative 4 conservation measures would result in
28 both temporary and permanent removal of Modesto song sparrow habitat in the quantities
29 indicated in Table 12-4-52. However, BDCP activities are expected to have little impact on the
30 population. Full implementation of Alternative 4 would include the following biological objectives
31 over the term of the BDCP which would also benefit Modesto song sparrow ([BDCP-see](#) Chapter 3,
32 Section 3.3, *Biological Goals and Objectives*, [of the Draft BDCP](#)).

- 33 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
34 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
35 associated with CM7).
- 36 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
37 10 (Objective VFRNC1.2, associated with CM3).
- 38 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
39 and/or 7 (Objective TFEWNC1.1, associated with CM4).

- 1 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
2 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
3 associated with CM10)
- 4 • Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,
5 associated with CM10).
- 6 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
7 VPNC2.5, and GNC2.4, associated with CM11).
- 8 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
9 lands that occur in cultivated lands within the reserve system, including isolated valley oak
10 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
11 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
12 with CM3).
- 13 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
14 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
15 with CM3).

16 As explained below, with the restoration or protection of these amounts of habitat, in addition to
17 implementation of AMM1–AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*,
18 and Mitigation Measure BIO-75, impacts on Modesto song sparrow would not be adverse for NEPA
19 purposes and would be less than significant for CEQA purposes.

20 **Table 12-4-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative 4**
21 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	4968	4968	7381	7381	NA	NA
Total Impacts CM1		4968	4968	7381	7381	NA	NA
CM2–CM18	Nesting	2,444	3,253	133	169	81-158	284
Total Impacts CM2–CM18		2,444	3,253	133	169	81-158	284
TOTAL IMPACTS		2,4935	3,3023	2062	2422	81-158	284
		12	21	14	50		

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

1 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**
2 **Sparrow**

3 Alternative 4 conservation measures would result in the combined permanent and temporary loss
4 of up to 3,544-571 acres of modeled habitat for Modesto song sparrow (3,302-321 acres of
5 permanent loss and 242-250 acres of temporary loss, Table 12-4-52). Conservation measures that
6 would result in these losses are conveyance facilities and transmission line construction, and
7 establishment and use of ~~reusable tunnel material~~~~borrow and spoil~~ areas (CM1), Yolo Bypass
8 fisheries improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5).
9 Habitat enhancement and management activities (CM11), which include ground disturbance or
10 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
11 maintenance activities associated with the long-term operation of the water conveyance facilities
12 and other BDCP physical facilities could degrade or eliminate Modesto song sparrow modeled
13 habitat. Temporarily affected areas would be restored as riparian habitat within 1 year following
14 completion of construction activities as described in AMM10 Restoration of Temporarily Affected
15 Natural Communities. Although the effects are considered temporary, the restored riparian habitat
16 would require a period of time for ecological succession to occur and for restored riparian habitat to
17 functionally replace habitat that has been affected. Each of these individual activities is described
18 below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion
19 follows the individual conservation measure discussions.

- 20 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 conveyance
21 facilities would result in the combined permanent and temporary loss of up to ~~122-149~~ acres of
22 modeled Modesto song sparrow habitat (~~49-68~~ acres of permanent loss, ~~73-81~~ acres of
23 temporary loss) from CZs 3-6 and CZ 8. The CM1 construction footprint overlaps with ~~35-77~~
24 Modesto song sparrow occurrences and the species is ubiquitous throughout the Delta. The
25 ~~reusable~~ Reusable tunnel ~~Tunnel material~~ Material storage areas throughout the central Delta
26 overlaps with ~~25-24~~ occurrences, shaft locations along the tunnel alignment overlap with 9
27 occurrences, the permanent transmission line overlaps with ~~four-6~~ occurrences, and ~~three-1~~
28 occurrences overlaps with the construction of the new forebay in CZ 8. In addition, ~~the~~
29 ~~temporary~~ impacts overlap with species occurrences including the construction of a
30 transmission line (1 occurrence), and a barge unloading facility north of Bacon Island overlap
31 with three occurrences of Modesto song sparrow geotechnical exploration zones along the
32 tunnel alignment (17 occurrences). Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
33 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and
34 the establishment of no-disturbance buffers and would be available to address adverse effects
35 on nesting Modesto song sparrows. Refer to the Terrestrial Biology Map ~~B~~ book in Appendix A of
36 this RDEIR/SDEIS for a detailed view of Alternative 4 construction locations. Construction of the
37 water conveyance facilities and the resultant impacts would occur within the first 10-14 years of
38 Plan implementation.
- 39 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
40 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo
41 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses
42 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural
43 community and managed wetland. The loss is expected to occur during the first 10 years of
44 Alternative 4 implementation.

- 1 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
2 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled
3 Modesto song sparrow habitat by the late long-term timeframe.
- 4 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
5 seasonally inundated floodplain would permanently and temporarily remove approximately 80
6 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses
7 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The
8 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural
9 community. These lands would be managed as a mosaic of seral stages, age classes, and plant
10 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 11 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
12 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
13 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
14 activity would occur along waterway margins where riparian habitat stringers exist, including
15 levees and channel banks. The improvements would occur within the study area on sections of
16 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
17 Some of the restored riparian habitat in the channel margin would be expected to support
18 nesting habitat for Modesto song sparrow.
- 19 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
20 actions included in CM11 that are designed to enhance wildlife values in restored or protected
21 habitats could result in localized ground disturbances that could temporarily remove small
22 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
23 vegetation and road and other infrastructure maintenance activities, would be expected to have
24 minor adverse effects on available habitat and would be expected to result in overall
25 improvements to and maintenance of habitat values over the term of the BDCP.
- 26 Habitat management- and enhancement-related activities could affect Modesto song sparrow
27 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could
28 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in
29 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
30 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these adverse
31 effects.
- 32 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
33 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
34 disturbances that could affect Modesto song sparrow use of the surrounding habitat.
35 Maintenance activities would include vegetation management, levee and structure repair, and
36 re-grading of roads and permanent work areas. These effects, however, would be reduced by
37 AMMs and conservation actions as described below.
- 38 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
39 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,
40 because they would be expected to avoid contact with construction and other equipment. If
41 ~~either the~~ species were to nest in the construction area, construction-related activities, including
42 equipment operation, noise and visual disturbances could destroy nests or lead to their
43 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
44 available to address these effects.

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. Alternative 4 would remove ~~2,699-726~~
9 acres of modeled habitat (~~2,493-512~~ permanent, ~~206-214~~ temporary) for Modesto song sparrow in
10 the study area in the near-term. These effects would result from the construction of the water
11 conveyance facilities (CM1, ~~122-149~~ acres), and implementing other conservation measures (*CM2*
12 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
13 *Inundated 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 ~~122-149~~ acres of suitable habitat should be restored/created and ~~122-149~~ acres
17 should be protected to compensate for the CM1 losses of ~~122-149~~ acres of Modesto song sparrow
18 habitat. The near-term effects of other conservation actions would remove 2,577 acres of modeled
19 habitat, and therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of
20 Modesto song sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for
21 restoration/creation and 1:1 for 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 2,000 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 (see Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These
26 conservation actions are associated with CM3, CM4, CM7, and CM10 and would occur in the same
27 timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
28 habitat loss on Modesto song sparrow. The majority of the riparian restoration acres would occur in
29 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
30 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in ~~BDCP~~ Chapter 3, *Conservation*
31 *Strategy, of the Draft BDCP*) and would provide suitable Modesto song sparrow nesting habitat. The
32 tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
33 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
34 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
35 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
36 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
37 CM10 and would provide nesting habitat for Modesto song sparrow.

38 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
39 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
40 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
41 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
42 The management of protected grasslands to increase insect prey through techniques such as the
43 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
44 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
 12 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
 13 *[RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.](#)*

14 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse
 15 effect on individuals, preconstruction surveys for ~~noncovered~~ avian species would be required to
 16 ensure that nests are detected and avoided. 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 ***Late Long-Term Timeframe***

20 Alternative 4 as a whole would result in the permanent loss of and temporary effects on ~~3,544-571~~
 21 ~~acres (3,302-321 acres of permanent loss, 242-250 acres of temporary loss)~~ of modeled Modesto
 22 song sparrow habitat during the term of the Plan. The locations of these losses are described above
 23 in the analyses of individual conservation measures. The Plan includes conservation commitments
 24 through *CM3 Natural Communities Protection and Restoration, CM4 Tidal Natural Communities*
 25 *Restoration, and CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of
 26 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent
 27 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the
 28 Plan Area ([see](#) Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). Additional
 29 acres of valley/foothill riparian habitat would be restored as a component of channel margin
 30 enhancement actions (CM6) along 20 miles of river and slough channels in the Delta, some of which
 31 would be expected to support nesting habitat for Modesto song sparrow. Of the 5,000 acres of
 32 restored riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would
 33 be restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
 34 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
 35 in the Plan for riparian restoration also include the maintenance and enhancement of structural
 36 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting habitat for Modesto song
 37 sparrow.

38 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
 39 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
 40 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
 41 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
 42 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
 43 CM10 and would provide nesting habitat for Modesto song sparrow.

1 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
 2 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
 3 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
 4 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
 5 management of protected grasslands to increase insect prey through techniques such as the
 6 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
 7 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
 8 standards for considering the effectiveness of conservation actions. The acres of restoration and
 9 protection contained in the near-term Plan goals and the additional detail in the biological objectives
 10 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
 11 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
 19 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
 20 [RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures](#). Modesto song sparrow is
 21 not a 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 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential mortality of this special-
 26 status species under Alternative 4 would represent an adverse effect in the absence of other
 27 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,
 28 CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would
 29 be in place ~~during all project activities throughout the construction period~~, the effects of habitat loss
 30 on Modesto song sparrow under Alternative 4 would not be adverse. The Modesto song sparrow is
 31 not a covered species under the BDCP, and potential mortality would be an adverse effect without
 32 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75
 33 would be available to address this effect.

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. Alternative 4 would remove 2,699
 40 726 acres of modeled habitat (2,493-512 permanent, 206-214 temporary) for Modesto song sparrow
 41 in the study area in the near-term. These effects would result from the construction of the water
 42 conveyance facilities (CM1, 122-149 acres), and implementing other conservation measures (*CM2*
 43 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
 44 *Inundated Floodplain Restoration—2,577 acres*).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
 2 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
 3 would indicate that ~~122-149~~ acres of suitable habitat should be restored/created and ~~122-149~~ acres
 4 should be protected to mitigate the CM1 losses of ~~122-149~~ acres of Modesto song sparrow habitat.
 5 The near-term effects of other conservation actions would remove 2,577 acres of modeled habitat,
 6 and therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto
 7 song sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation
 8 and 1:1 for protection).

9 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
 10 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent
 11 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
 12 Plan Area (see Table 3-4 in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). These
 13 conservation actions are associated with CM3, CM4, CM7, and CM10 and would occur in the same
 14 timeframe as the construction and early restoration losses, thereby avoiding a significant impact of
 15 habitat loss on Modesto song sparrow. The majority of the riparian restoration acres would occur in
 16 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
 17 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in *BDCP-Chapter 3, Conservation*
 18 *Strategy, of the Draft BDCP*) and would provide suitable Modesto song sparrow nesting habitat. The
 19 tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
 20 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
 21 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
 22 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
 23 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
 24 CM10 and would provide nesting habitat for Modesto song sparrow.

25 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
 26 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
 27 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
 28 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
 29 The management of protected grasslands to increase insect prey through techniques such as the
 30 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
 31 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
 32 standards for considering the effectiveness of conservation actions.

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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
 40 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
 41 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

42 In the absence of other conservation actions, the effects on Modesto song sparrow habitat would
 43 represent an adverse effect as a result of habitat modification and potential direct mortality of a
 44 special-status species. This impact would be significant. Modesto song sparrow is not a covered
 45 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction

1 surveys for noncovered avian species would be required to ensure that nests are detected and
 2 avoided. The acres of restoration and protection contained in the near-term Plan goals and the
 3 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
 4 the project-level effects of CM1 on Modesto song sparrow, as well as mitigate the near-term effects
 5 of the other conservation measures. With the acres of habitat protection and restoration described
 6 above, in addition to AMM1-7, and implementation of Mitigation Measure BIO-75, Conduct
 7 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, Alternative 4 would not
 8 result in a substantial adverse effect through habitat modification and would not substantially
 9 reduce the number or restrict the range of the species. Therefore, Alternative 4 would have a less-
 10 than-significant impact on Modesto song sparrow.

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. Modesto song~~
 18 ~~sparrow is not a covered species under the BDCP. For the BDCP to have a less-than-significant~~
 19 ~~impact on individuals, preconstruction surveys for noncovered avian species would be required to~~
 20 ~~ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,~~
 21 ~~Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce~~
 22 ~~this impact to a less than significant level.~~

23 **Late Long-Term Timeframe**

24 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 3,544-571
 25 acres (3,302-321 acres of permanent loss, 242-250 acres of temporary loss) of modeled Modesto
 26 song sparrow habitat during the term of the Plan. The locations of these losses are described above
 27 in the analyses of individual conservation measures. The Plan includes conservation commitments
 28 through CM3 Natural Communities Protection and Restoration, CM4 Tidal Natural Communities
 29 Restoration, and CM10 Nontidal Marsh Restoration to protect 750 acres and restore 5,000 acres of
 30 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent
 31 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the
 32 Plan Area (see Table 3-4 in Chapter 3, Description of Alternatives, of this RDEIR/SDEIS). Additional
 33 acres of valley/foothill riparian habitat would be restored as a component of channel margin
 34 enhancement actions (CM6) along 20 miles of river and slough channels in the Delta, some of which
 35 would be expected to support nesting habitat for Modesto song sparrow. Of the 5,000 acres of
 36 restored riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would
 37 be restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
 38 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
 39 in the Plan for riparian restoration also include the maintenance and enhancement of structural
 40 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting habitat for Modesto song
 41 sparrow.

42 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
 43 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
 44 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
 45 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in

1 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
2 CM10 and would provide nesting habitat for Modesto song sparrow.

3 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
4 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
5 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
6 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
7 management of protected grasslands to increase insect prey through techniques such as the
8 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
9 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
10 standards for considering the effectiveness of conservation actions. The acres of restoration and
11 protection contained in the near-term Plan goals and the additional detail in the biological objectives
12 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
13 song sparrow, 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
21 *updated version of AMM6 is described in [Appendix D, Substantive BDCP Revisions, of this](#)*
22 *RDEIR/SDEISBDCP [Appendix 3.C, Avoidance and Minimization Measures](#). ~~Modesto song sparrow is~~*
23 *~~not a covered species under the BDCP. For the BDCP to minimize direct mortality of individuals,~~*
24 *~~preconstruction surveys for noncovered avian species would be required to ensure that nests are~~*
25 *~~detected and avoided. Implementation of Mitigation Measure BIO-75, [Conduct Preconstruction](#)~~*
26 *[Nesting Bird Surveys and Avoid Disturbance of Nesting Birds](#), would reduce this impact to a less-than-*
27 *significant level.*

28 In the absence of other conservation actions, the effects on Modesto song sparrow habitat would
29 represent an adverse effect as a result of habitat modification and potential direct mortality of a
30 special-status species. This impact would be significant. Considering Alternative 4's protection and
31 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
32 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
33 the implementation of AMM1-AMM7, and Mitigation Measure BIO-75, the loss of habitat or direct
34 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
35 through habitat modifications and would not substantially reduce the number or restrict the range
36 of either species. Therefore, the loss of habitat or potential mortality under this alternative would
37 have a less-than-significant impact on Modesto song 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.

1 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**
2 **Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song
5 sparrow and the incremental increased risk from the construction of new transmission lines is not
6 expected to adversely affect the population.

7 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new
8 transmission lines would not adversely affect the Modesto song sparrow population.

9 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of
10 new transmission lines would have a less-than-significant impact on the Modesto song sparrow
11 population.

12 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

13 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated
14 with construction-related activities could result in temporary disturbances that affect Modesto song
15 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50
16 dBA) could extend 500 to 5,250 feet from the edge of construction activities ([Draft BDCP Appendix](#)
17 [5.J, Attachment 5J.D, Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill](#)
18 [Crane, Table 4 in Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS](#)), although there are no
19 available data to determine the extent to which these noise levels could affect Modesto song
20 sparrow. Indirect effects associated with construction include noise, dust, and visual disturbance
21 caused by grading, filling, contouring, and other ground-disturbing operations. Construction-related
22 noise and visual disturbances could disrupt nesting and foraging behaviors, and reduce the
23 functions of suitable habitat which could result in an adverse effect on these species. Mitigation
24 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
25 *Birds*, would be available to minimize adverse effects on active nests. The use of mechanical
26 equipment during water conveyance construction could cause the accidental release of petroleum or
27 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1–
28 AMM7 including *AMM2 Construction Best Management Practices and Monitoring* would minimize the
29 likelihood of such spills from occurring. The inadvertent discharge of sediment or excessive dust
30 adjacent to Modesto song sparrow could also have a negative effect on these species. AMM1–AMM7
31 would ensure that measures are in place to prevent runoff from the construction area and the
32 negative effects of dust 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, of the Draft BDCP](#) for details of restoration). Species sensitivity to methylmercury differs
39 widely and there is a large amount of uncertainty with respect to species-specific effects. Increased
40 methylmercury associated with natural community and floodplain restoration could indirectly affect
41 Modesto song sparrow, via uptake in lower trophic levels (as described in [the BDCP, Appendix 5.D,](#)
42 [Contaminants, of the Draft EIR/EIS](#)).

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* (as revised in Appendix D, *Substantive BDCP Revisions, in this RDEIR/SDEIS*) contains
4 provisions for project-specific Mercury Management Plans. Site-specific restoration plans that
5 address the creation and mobilization of mercury, as well as monitoring and adaptive management
6 as described in CM12 would be available to address the uncertainty of methylmercury levels in
7 restored tidal marsh and potential impacts on Modesto song sparrow.

8 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative 4
9 water conveyance facilities could adversely affect individuals in the absence of other conservation
10 actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation
11 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
12 *Birds*, would minimize this adverse effect. The implementation of tidal natural communities
13 restoration or floodplain restoration could result in increased exposure of Modesto song sparrow to
14 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the
15 species and the potential for increased exposure varies substantially within the study area. Site-
16 specific restoration plans that address the creation and mobilization of mercury, as well as
17 monitoring and adaptive management as described in *CM12 Methylmercury Management* would
18 address the potential impacts of methylmercury levels in restored tidal marsh in the study area. The
19 site-specific planning phase of marsh restoration would be the appropriate place to assess the
20 potential for risk of methylmercury exposure for Modesto song sparrow, once site specific sampling
21 and other information could be developed.

22 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the
23 Alternative 4 water conveyance facilities could have a significant impact on the species. The
24 incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-
25 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
26 reduce this impact to a less-than-significant level. The implementation of tidal natural communities
27 restoration or floodplain restoration could result in increased exposure of Modesto song sparrow to
28 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the
29 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well
30 as monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
31 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.

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-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**
36 **Implementation of Conservation Components**

37 Flooding of the Yolo Bypass (CM2) would inundate 81–158 acres of modeled Modesto song sparrow
38 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat
39 availability would be expected during the fledgling period of the nesting season due to periodic
40 inundation.

41 Based on hypothetical floodplain restoration, construction of setback levees from seasonally
42 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately
43 284 acres of Modesto song sparrow modeled habitat (Table 12-4-52).

1 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to
2 restore a more natural flood regime in support of wetland and riparian vegetation types that
3 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during
4 years when flooding extends into the nesting season (past March).

5 **NEPA Effects:** Periodic effects of inundation would not result in an adverse effect on Modesto song
6 sparrow because increased frequency and duration of inundation would be expected to restore a
7 more natural flood regime in support of wetland and riparian vegetation types that support Modesto
8 song sparrow habitat.

9 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
10 Modesto song sparrow because increased frequency and duration of inundation would be expected
11 to restore a more natural flood regime in support of wetland and riparian vegetation types that
12 support Modesto song sparrow habitat.

13 **Bank Swallow**

14 This section describes the effects of Alternative 4, including construction and implementation of
15 other conservation components, on bank swallow. Bank swallows nest in colonies along rivers,
16 streams, or other water and require fine textured sandy soils in vertical banks to create their
17 burrows. There is little suitable habitat for bank swallow in the study area because most of the
18 erodible banks have been stabilized with of levee revetment. The placement of rock revetment
19 prevents the lateral migration of rivers, removing the natural river process that creates vertical
20 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences
21 2007).An estimated 70-90% of the bank swallow population in California nests along the
22 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of
23 the study area. However, there are three CNDDDB records of bank swallow colonies in the study area:
24 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.

25 The closest natural community to represent modeled habitat for bank swallow is valley foothill
26 riparian. Although there are impacts to the valley foothill riparian natural community along the
27 northeast corner of Clifton Court Forebay, at the intermediate forebay, and on Bouldin Island, it is
28 highly unlikely that the habitat in these locations is suitable for bank swallow (alluvial soils that
29 form steep, eroded banks that have not been stabilized with levee revetment). Reusable tunnel
30 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that the
31 substrate would provide suitable nesting habitat for the species. However, if reusable tunnel
32 material areas were to become suitable for swallows over time, Mitigation Measure BIO-146 Active
33 Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized,
34 would avoid impacts on nesting bank swallows by requiring surveys to be conducted prior to the
35 removal of reusable tunnel material. Construction and restoration associated with Alternative 4
36 conservation measures would not result in the direct loss of modeled habitat for bank swallow.
37 However, indirect effects of noise and visual disturbance from CM2 Yolo Bypass Fisheries
38 Enhancements and CM4 Tidal Natural Communities Restoration could impact bank swallow colonies
39 if they were present near work areas. In addition, there is uncertainty with respect to how water
40 flows upstream of the study area would affect bank swallow habitat.

41 As explained below, impacts on bank swallow under Alternative 4 would not be adverse for NEPA
42 purposes and would be less than significant for CEQA purposes with the implementation of
43 mitigation measures to monitor colonies and address the uncertainty of upstream operations on the
44 species.

1 **Table 12-4-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	Yolo	Floodplain
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Nesting	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		0	0	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

2

3 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**
4 **Swallow**

5 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*
6 *Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of earthmoving
7 equipment and human activities at work sites, could result in temporary disturbances that cause
8 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies
9 with occupied burrows have been recorded in CZ 2 and CZ 5 and construction-related disturbances
10 could result in an adverse effect on individuals. Various activities related to *CM11 Natural*
11 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.

12 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank
13 swallow colonies in the absence of other measures. Noise and visual disturbances could result in
14 adverse effects on bank swallows if active colonies were present within 500 feet of work areas.
15 Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on*
16 *Bank Swallow Will Be Minimized*, would be available to address this effect.

17 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a
18 significant impact on bank swallow colonies in the absence of other measures. Noise and visual
19 disturbances could result in significant impacts on bank swallows if active colonies were present
20 within 500 feet of work areas. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow*
21 *Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this
22 impact to a less-than-significant level.

1 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**
2 **Effects on Bank Swallow Will Be Minimized**

3 To the extent practicable, BDCP proponents will not construct conservation components during
4 the bank swallow nesting season (April 1 through August 31). If construction activities cannot
5 be avoided during nesting season, a qualified biologist will conduct preconstruction surveys to
6 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If
7 no active nesting colonies are present, no further mitigation is required. Reusable tunnel
8 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that
9 the substrate would provide suitable nesting habitat for the species. However, reusable tunnel
10 material sites could become suitable for swallows over time. Surveys of reusable tunnel material
11 areas that have been present for at least 1 year, allowing the substrate to stabilize, will be
12 conducted prior to the removal of reusable tunnel material.

13 If active colonies are detected, BDCP proponents will establish a nondisturbance buffer
14 (determined in coordination with CDFW and the Bank Swallow Technical Advisory Committee)
15 around the colony during the breeding season. In addition, a qualified biologist will monitor any
16 active colony within 500 feet of construction to ensure that construction activities do not affect
17 nest success.

18 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**
19 **on Bank Swallow**

20 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes
21 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the
22 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.
23 Because of this limited available habitat, and the reduction of natural river process, the species is
24 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat
25 creation, and 2) high flows during the breeding season. The potential impacts of changes in
26 upstream flows during the breeding season on bank swallows are the flooding of active burrows and
27 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin
28 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank
29 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March when
30 the swallows have nested and laid eggs in the burrows could result in the loss of nests. On the
31 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with
32 localized bank collapses that resulted in partial or complete colony failure (Stillwater Sciences
33 2007).

34 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations
35 on the Sacramento River (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,
36 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-
37 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).
38 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical
39 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, of this
40 RDEIR/SDEIS for a description of the model).

41 On the Sacramento River at the Keswick and Red Bluff gauges, mean monthly flows under
42 Alternative 4 would could increase between April and August in below normal, dry, and critical
43 years based on modeling assumptions and output (Table 1 in Section 11C.4.1.1 and Table 3 in
44 Section 11C.4.1.2 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*, of the Draft

1 [EIR/EIS](#)) which could lead to inundation of active colonies. However, [model outputs indicate that](#)
 2 [the](#) flows under Existing Conditions and the predicted flows in the late long-term without the project
 3 (NAA) also show increases in flows during the breeding season (April through August) in these
 4 water year types. Similar trends are shown for the Feather River (Table 15 in Section 11C.4.1.8 and
 5 Table 17 in Section 11C.4.1.9 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis,*
 6 [of the Draft EIR/EIS](#)). In addition, at the Verona flow gauge on the Sacramento River in average
 7 water years (Table 7 in Section 11C.4.1.4 of Appendix 11C, *CALSIM II Model Results Utilized in the*
 8 *Fish Analysis, of the Draft EIR/EIS*) flows are predicted to be greater than 14,000 cfs during the
 9 breeding season (April through August,) which could lead to bank collapse. However, flows of this
 10 height are recorded under Existing Conditions at this flow gague and are also predicted for the late
 11 long-term without the project (NAA).

12 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting
 13 bank swallow colonies during the breeding season, and predicted flows under Alternative 4 would
 14 not be substantially greater than under the No Action Alternative. However, because of the
 15 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 16 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
 17 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank
 18 swallow, and even moderate changes in seasonal flows could have an adverse effect on breeding
 19 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate*
 20 *Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of
 21 potential adverse effects of upstream operations on bank swallow.

22 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be
 23 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative
 24 4 would not be substantially greater than under the No Action Alternative. However, because of the
 25 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 26 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
 27 There are many variables that dictate suitable habitat for the species that cannot be clearly
 28 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank
 29 swallow depending on soil type and location of current colonies. Implementation of Mitigation
 30 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*
 31 *the Study Area*, would address this potential significant impact and further determine if additional
 32 mitigation is required for bank swallow.

33 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**
 34 **Spring Flows Upstream of the Study Area**

35 [To address the uncertainty of the impact of upstream spring flows on existing bank swallow](#)
 36 [habitat, DWR will monitor existing colonies upstream of the study area and collect habitat](#)
 37 [suitability data including soil type, number of active burrows per colony, and height of average](#)
 38 [burrows. DWR will quantify the magnitude of spring flows that would not result in potential](#)
 39 [mortality of active colonies. In addition, to determine the degree to which reduced winter flows](#)
 40 [are contributing to habitat loss, DWR will quantify the winter flows required for river meander](#)
 41 [to create suitable habitat through lateral channel migration and bank resurfacing. If impacts of](#)
 42 [upstream flows on bank swallow are identified, replacement habitat will be established at a](#)
 43 [minimum of 2:1 for the length of bank habitat affected. Replacement habitat will consist of](#)
 44 [removing bank revetment to create habitat for bank swallow at a location subject to CDFW](#)
 45 [approval \(Bank Swallow Technical Advisory Committee 2013\).](#)

1 ~~To address the uncertainty of the impact of upstream spring flows on existing bank swallow~~
2 ~~habitat, DWR will monitor existing colonies upstream of the study area and collect habitat~~
3 ~~suitability data including soil type, number of active burrows per colony, and height of average~~
4 ~~burrows. In addition, to determine the degree to which reduced winter flows are contributing to~~
5 ~~habitat loss, DWR will quantify the winter flows required for river meander to create suitable~~
6 ~~habitat through lateral channel migration and bank resurfacing. If impacts of upstream flows on~~
7 ~~bank swallow are identified, further mitigation may be required after consultation with CDFW~~
8 ~~and the Bank Swallow Technical Advisory Committee. Recommended mitigation for changes in~~
9 ~~flow regimes associated with water conveyance includes conservation easements on currently~~
10 ~~occupied habitat or revetment removal projects to create habitat for bank swallow (Bank~~
11 ~~Swallow Technical Advisory Committee 2013).~~

12 **Yellow-Headed Blackbird**

13 This section describes the effects of Alternative 4, including water conveyance facilities construction
14 and implementation of other conservation components, on yellow-headed blackbird. The habitat
15 model used to assess impacts on yellow-headed blackbird includes nesting habitat and foraging
16 habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural seasonal
17 wetland, nontidal freshwater perennial emergent wetland, and managed wetland. These natural
18 communities support aquatic insects which are important prey items for yellow-headed blackbird
19 young (Beedy 2008). Modeled foraging habitat for yellow-headed blackbird consists of cultivated
20 lands and noncultivated land cover types known to support abundant insect populations, including
21 corn, pasture, and feedlots.

22 Construction and restoration associated with Alternative 4 conservation measures would result in
23 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in
24 Table 12-4-54. Full implementation of Alternative 4 would include the following biological
25 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (BDCP see
26 Chapter 3, Section 3.3, Biological Goals and Objectives, of the Draft BDCP).

- 27 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
28 and/or 7 (Objective TFEWNC1.1, associated with 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 (Objective NFEW/NPANC1.1,
31 associated with CM10).
- 32 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
33 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 34 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
35 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
36 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 37 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 38 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
39 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 40 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
41 lands that occur in cultivated lands within the reserve system, including isolated valley oak
42 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 • Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-4-
4 54) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).
 - 5 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
6 lands that occur in cultivated lands within the reserve system, including isolated valley oak
7 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
8 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
9 with CM3).
 - 10 • Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4,
11 associated with CM11)

12 As explained below, with the restoration or protection of these amounts of habitat, in addition to
13 management activities to enhance habitats for the species and implementation of AMM1–AMM7,
14 *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird
15 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative 4

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	1,527	1,527	4351	4351	NA	NA
	Foraging	1,994 82	1,994 2	642 9	642 9	NA	NA
Total Impacts CM1		2,009 609	2,009 609	685 0	685 0	NA	NA
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
Total Impacts CM2-CM18		11,426	40,575	421	951	1,495-4,394	2,719
Total Nesting		5,829 41	13,917 929	8896	8997	961-2,678	18
Total Foraging		7,606 94	28,667 255	1,0187 75	1,547 1,304	368-1,476	2,701
TOTAL IMPACTS		13,435 035	42,584 184	1,1068 71	1,636 401	1,495-4,394	2,719

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 4443,220-585 acres of modeled habitat (14,006-026 acres of nesting habitat and 30,21429,559 acres of foraging habitat) for yellow-headed blackbird (Table 12-4-54). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). 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 yellow-headed blackbird suitable habitat. Each of these individual activities is described below. A

1 summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the
2 individual conservation measure discussions.

- 3 • *CM1 Water Facilities Construction and Operation*: Construction of Alternative 4 water conveyance
4 facilities would result in the combined permanent and temporary loss of up to 58-78 acres of
5 yellow-headed blackbird nesting habitat (15-27 acres of permanent loss and 43-51 acres of
6 temporary loss). In addition, 2,6361,981 acres of foraging habitat would be removed (1,994-582
7 acres of permanent loss, 642-399 acres of temporary loss). Activities that would impact suitable
8 Yellowyellow-headed blackbird habitat consist of tunnel, forebay, and intake construction,
9 temporary access roads, and construction of transmission lines. The largest losses of foraging
10 habitat would occur from loss of corn. There are no occurrences of yellow-headed blackbird that
11 overlap with the construction footprint for CM1. However, Mitigation Measure BIO-75, *Conduct*
12 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
13 to address adverse effects on nesting yellow-headed blackbirds. Impacts from CM1 would occur
14 in the central delta in CZs 3–6, and CZ 8. Refer to the Terrestrial Biology Map-Book in Appendix
15 A of this RDEIR/SDEIS for a detailed view of Alternative 4 construction locations. Impacts from
16 CM1 would occur within the first 10-14 years of Plan implementation.
- 17 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries enhancement
18 would result in the combined permanent and temporary loss of up to 100 acres of nesting
19 habitat (55 acres of permanent loss, 45 acres of temporary loss) in the Yolo Bypass in CZ 2. In
20 addition, 1,144 acres of foraging habitat would be removed (879 acres of permanent loss, 265
21 acres of temporary loss). The loss is expected to occur during the first 10 years of Alternative 4
22 implementation.
- 23 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation from CM4 would
24 permanently remove or convert an estimated 13,847 acres of nesting habitat, which would
25 consist primarily of managed wetland. In addition, 20,029 acres of foraging habitat would be
26 lost or converted as a result of tidal restoration, over half of which would be from the loss or
27 conversion of alfalfa. However, the resulting 65,000 acres of tidal natural communities would
28 also provide habitat for the species, 24,000 acres of which would be tidal freshwater natural
29 communities providing breeding habitat for yellow-headed blackbird.
- 30 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
31 seasonally inundated floodplain and riparian restoration actions would remove approximately 2
32 acres of yellow-headed blackbird nesting habitat (1 acres of permanent loss, 1 acres of
33 temporary loss) and 1,641 acres of foraging habitat (1,051 acres of permanent loss, 590 acres of
34 temporary loss). These losses would be expected after the first 10 years of Alternative 4
35 implementation along the San Joaquin River and other major waterways in CZ 7.
- 36 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
37 approximately 509 acres of yellow-headed blackbird foraging habitat as part of tidal restoration
38 and 2,033 acres as part of seasonal floodplain restoration through CM7.
- 39 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
40 implemented on agricultural lands and would result in the conversion of 926 acres of yellow-
41 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
42 and 11. If agricultural lands supporting higher value foraging habitat than the restored
43 grassland were removed, there would be a loss of white-tailed kite foraging habitat value. CM8
44 would result in the restoration of 2,000 acres of grassland foraging habitat in the study area.

- 1 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
2 result in the permanent conversion of 988 acres of cultivated lands foraging habitat to nontidal
3 marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins
4 of restored nontidal marsh and restoration would also provide foraging habitat for the species.
- 5 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
6 enhancement-related activities could disturb yellow-headed blackbird nests if they were
7 present near work sites. A variety of habitat management actions included in CM11 that are
8 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
9 disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat
10 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
11 such as removal of nonnative vegetation and road and other infrastructure maintenance, would
12 be expected to have minor effects on available yellow-headed blackbird habitat. These effects
13 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
14 the AMMs listed below ([AMMs are described in detail in Appendix 3.C, Avoidance and](#)
15 [Minimization Measures, of the Draft BDCP, and an updated version of AMM6 Disposal and Reuse](#)
16 [of Spoils, Reusable Tunnel Material and Dredged Material is described in Appendix D, Substantive](#)
17 [BDCP Revisions, of this RDEIR/SDEIS](#)). CM11 would also include the construction of recreational-
18 related facilities, including trails, interpretive signs, and picnic tables ([BDCP-see Chapter 4,](#)
19 [Covered Activities and Associated Federal Actions, of the Draft BDCP](#)). 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 foraging 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 high-
24 yellow-headed blackbird foraging habitat for the development of a delta and longfin smelt
25 conservation hatchery in CZ 1. The loss is expected to occur during 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 yellow-headed blackbird use of the surrounding habitat.
30 Maintenance activities would include vegetation management, levee and structure repair, and
31 re-grading of roads and permanent work areas. These effects, however, would be reduced by
32 AMMs and conservation actions as described below.
- 33 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
34 direct mortality of adult or fledged yellow-headed blackbird if they were present in the study
35 area, because they would be expected to avoid contact with construction and other equipment. If
36 yellow-headed blackbird were to nest in the construction area, construction-related activities,
37 including equipment operation, noise and visual disturbances could destroy nests or lead to
38 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,
39 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
40 available to address these adverse effects on yellow-headed blackbird.

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. Alternative 4 would remove 5,917,937
 6 acres (5,829,841 acres of permanent loss, 88,96 acres of temporary loss) of yellow-headed blackbird
 7 nesting habitat in the study area in the near-term. These effects would result from the construction
 8 of the water conveyance facilities (CM1, 58,78 acres), and implementing other conservation
 9 measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and
 10 *CM5 Seasonally Inundated Floodplain Restoration*—5,859 acres). In addition, 8,624,969 acres of
 11 yellow-headed blackbird foraging habitat would be removed or converted in the near-term (CM1,
 12 2,6361,981 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
 13 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*
 14 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, and
 15 *CM18 Conservation 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 58,78 acres of nesting habitat should be
 19 restored/created and 58,78 acres should be protected to compensate for the CM1 losses of 78 acres
 20 of yellow-headed blackbird nesting habitat. In addition, 2,6361,981 acres of foraging habitat should
 21 be protected to compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The
 22 near-term effects of other conservation actions would require 5,859 acres each of restoration and
 23 protection of breeding habitat and 5,988 acres of protection of foraging habitat using the same
 24 typical NEPA and CEQA ratios (1:1 ~~for~~ restoration and 1:1 ~~for~~ protection of nesting habitat, and 1:1
 25 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 (see Table 3-4 in Chapter
 31 3, *Description of Alternatives*, of this RDEIR/SDEIS). These conservation actions are associated with
 32 CM3, CM4, CM8, and CM10 and would occur in the same timeframe as the construction and early
 33 restoration losses.

34 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
 35 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*, of the Draft BDCP) and would be restored in a
 36 way that creates topographic heterogeneity and in areas that increase connectivity among protected
 37 lands (Objective TFEWNC2.2). The 4,800 acres of managed wetland would be protected and
 38 enhanced in CZ 11 and would benefit yellow-headed blackbird through the enhancement of
 39 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
 40 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
 41 American bulrush plant associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal
 42 marsh would be created, some of which would provide nesting habitat for the species.

43 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 44 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 45 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 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 15,600 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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
23 [updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)
24 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures.](#)

25 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
26 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
27 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
28 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
29 address this adverse effect.

30 **Late Long-Term Timeframe**

31 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
32 of modeled foraging habitat for yellow-headed blackbird. Alternative 4 as a whole would result in
33 the permanent loss of and temporary effects on 14,006-026 acres of potential nesting habitat (17%
34 of the potential nesting habitat in the study area) and the loss or conversion of 30,21429,559 acres
35 of foraging habitat (9% of the foraging habitat in the study area). The locations of these losses are
36 described above in the analyses of individual conservation measures.

37 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
38 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
39 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
40 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
41 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
42 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
43 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable

1 habitat for native wildlife species ([see Table 3-4 in Chapter 3, Description of Alternatives, of this](#)
2 [RDEIR/SDEIS](#)).

3 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
4 TFEWNC1.1 in [BDCP Chapter 3, Conservation Strategy, of the Draft BDCP](#)) and would be restored in a
5 way that creates topographic heterogeneity and in areas that increase connectivity among protected
6 lands (Objective TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and
7 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
8 of bare ground or marsh where the predominant vegetation consists of invasive species such as
9 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
10 associations (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be
11 created, some of which would provide nesting habitat for the species.

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 CZ 1, 8, and 11 would be associated with vernal pool and alkali
14 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
15 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
16 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
17 abundance would also be increased on protected lands, enhancing the foraging value of these
18 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
19 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
20 hedgerows along field borders and roadsides within protected cultivated lands (Objective
21 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
22 wetlands would also be protected and maintained as part of the cultivated lands reserve system
23 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
24 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
25 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
26 for tricolored blackbird ([see Table 3.3-6 in BDCP Chapter 3, Conservation Strategy, of the Draft](#)
27 [BDCP](#)). These crop types include pasture, sunflower, alfalfa, and other crop types that would provide
28 high-value foraging habitat for yellow-headed blackbird.

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 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)*
36 *[updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this](#)*
37 *[RDEIR/SDEIS](#)~~BDCP Appendix 3.C, Avoidance and Minimization Measures.~~*

38 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
39 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
40 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
41 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
42 address this effect.

43 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential direct mortality of this
44 special-status species associated with Alternative 4 would represent an adverse effect in the
45 absence of other conservation actions. However, with habitat protection and restoration associated

1 with CM3, CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–
2 AMM7, which would be in place ~~during all project activities throughout the construction period~~, the
3 effects of habitat loss would not be adverse under Alternative 4. The yellow-headed blackbird is not
4 a covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
5 preconstruction surveys for noncovered avian species would be required to ensure that nests are
6 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
7 *Avoid Disturbance of 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. Alternative 4 would remove 5,917
14 937 acres (5,829,841 acres of permanent loss, 88,96 acres of temporary loss) of yellow-headed
15 blackbird nesting habitat in the study area in the near-term. These effects would result from the
16 construction of the water conveyance facilities (CM1, 58,78 acres), and implementing other
17 conservation measures (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities
18 Restoration, and CM5 Seasonally Inundated Floodplain Restoration—5,859 acres). In addition,
19 8,6247,967 acres of yellow-headed blackbird foraging habitat would be removed or converted in the
20 near-term (CM1, 2,6361,981 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural
21 Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural
22 Community Restoration, CM8 Grassland Natural Community Restoration, CM10 Nontidal Marsh
23 Restoration, and CM18 Conservation Hatcheries—5,988 acres).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
25 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
26 of foraging habitat. Using these ratios would indicate that 58,78 acres of nesting habitat should be
27 restored/created and 58,78 acres should be protected to compensate for the CM1 losses of yellow-
28 headed blackbird nesting habitat. In addition, 2,6361,981 acres of foraging habitat should be
29 protected to compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-
30 term effects of other conservation actions would require 5,859 acres each of restoration and
31 protection of breeding habitat and 5,988 acres of protection of foraging habitat using the same
32 typical NEPA and CEQA ratios (1:1 ~~for~~ restoration and 1:1 for protection of nesting ~~habitat; and~~ 1:1
33 protection of foraging habitat).

34 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
35 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
36 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
37 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
38 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (see Table 3-4 in Chapter
39 3, *Description of Alternatives, of this RDEIR/SDEIS*). These conservation actions are associated with
40 CM3, CM4, CM8, and CM10 and would occur in the same timeframe as the construction and early
41 restoration losses.

42 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
43 TFEWNC1.1 in ~~BDCP~~ Chapter 3, *Conservation Strategy, of the Draft BDCP*) and would be restored in a
44 way that creates topographic heterogeneity and in areas that increase connectivity among protected

1 lands (Objective TFEWNC2.2). The 4,800 acres of managed wetland would be protected and
2 enhanced in CZ 11 and would benefit yellow-headed blackbird through the enhancement of
3 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
4 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
5 American bulrush plant associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal
6 marsh would be created, some of which would provide nesting habitat for the species.

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 grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
12 abundance would also be increased on protected lands, enhancing the foraging value of these
13 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
14 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
15 hedgerows along field borders and roadsides within protected cultivated lands (Objective
16 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
17 wetlands would also be protected and maintained as part of the cultivated lands reserve system
18 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

19 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife
20 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
21 provide foraging habitat for yellow-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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
29 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
30 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

31 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
32 represent an adverse effect as a result of habitat modification and potential direct mortality of a
33 special-status species. This impact would be significant. Yellow-headed blackbird is not a covered
34 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction
35 surveys for noncovered avian species would be required to ensure that nests are detected and
36 avoided. The acres of restoration and protection contained in the near-term Plan goals and the
37 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
38 the project-level effects of CM1 on yellow-headed blackbird habitat, as well as mitigate the near-
39 term effects of the other conservation measures. With the acres of habitat protection and restoration
40 described above, in addition to AMM1-7, and implementation of Mitigation Measure BIO-75, Conduct
41 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, Alternative 4 would not
42 result in a substantial adverse effect through habitat modification and would not substantially
43 reduce the number or restrict the range of the species. Therefore, Alternative 4 would have a less-
44 than-significant impact on yellow-headed blackbird.

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 ~~The yellow-headed blackbird is not a 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. The implementation of Mitigation Measure~~
11 ~~BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would~~
12 ~~reduce potential impacts on nesting yellow-headed blackbird to a less than significant level.~~

13 **Late Long-Term Timeframe**

14 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
15 of modeled foraging habitat for yellow-headed blackbird. Alternative 4 as a whole would result in
16 the permanent loss of and temporary effects on 14,006,026 acres of potential nesting habitat (17%
17 of the potential nesting habitat in the study area) and the loss or conversion of 30,214,29,559 acres
18 of foraging habitat (9% of the foraging habitat in the study area). The locations of these losses are
19 described above in the analyses of individual conservation measures.

20 The Plan includes conservation commitments through CM3 Natural Communities Protection and
21 Restoration, CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community
22 Restoration, and CM10 Nontidal Marsh Restoration to protect and enhance at least 8,100 acres of
23 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
24 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
25 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
26 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
27 habitat for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*, of this
28 RDEIR/SDEIS).

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*, of the Draft BDCP) and would be restored in a
31 way that creates topographic heterogeneity and in areas that increase connectivity among protected
32 lands (Objective TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and
33 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
34 of bare ground or marsh where the predominant vegetation consists of invasive species such as
35 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
36 associations (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be
37 created, some of 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 (see Table 3.3-6 in BDCP Chapter 3, Conservation Strategy, of the Draft
9 BDCP). These crop types include pasture, sunflower, alfalfa, and other crop types that would provide
10 high-value foraging habitat for yellow-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 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an
18 updated version of AMM6 is described in Appendix D, Substantive BDCP Revisions, of this
19 RDEIR/SDEISBDCP Appendix 3.C, Avoidance and Minimization Measures.

20 ~~The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an~~
21 ~~adverse effect on individuals, preconstruction surveys for noncovered avian species would be~~
22 ~~required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-~~
23 ~~75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would~~
24 ~~reduce this impact to a less-than-significant level.~~

25 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
26 represent an adverse effect as a result of habitat modification and potential direct mortality of a
27 special-status species. This impact would be significant. Considering Alternative 4's protection and
28 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
29 necessary to compensate for habitat lost to construction and restoration activities, and with the
30 implementation of AMM1-AMM7 and Mitigation Measure BIO-75, the loss of habitat or direct
31 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
32 through habitat modifications and would not substantially reduce the number or restrict the range
33 of yellow-headed blackbird. Therefore, the loss of habitat or potential mortality under this
34 alternative would have a less-than-significant impact on yellow-headed blackbird.

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-149: Effects on Yellow-Headed Blackbird 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 yellow-headed blackbirds. Yellow-headed blackbirds are colonial and have the
42 potential to collide with the proposed transmission lines when migrating in large flocks. However,
43 similar to tricolored blackbird behavior, daily flights associated with foraging likely occur in smaller

1 flocks at heights that are lower than the transmission lines (BDCP Attachment 5.I-2, Memorandum:
2 Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines). Marking transmission
3 lines with flight diverters that make the lines more visible to birds has been shown to dramatically
4 reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee (2008)
5 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. As
6 described in AMM20 Greater Sandhill Crane, all new project transmission lines would be fitted with
7 flight diverters which reduce the potential for yellow-headed blackbird collision with transmission
8 lines. Transmission line poles and towers also provide perching substrate for raptors, which could
9 result in increased predation pressure on yellow-headed blackbirds. The existing network of
10 transmission lines in the study area currently poses this risk for yellow-headed blackbirds, and any
11 incremental risk associated with the new transmission line corridors would be expected to be low.
12 AMM20 Greater Sandhill Crane would further minimize the risk for bird-power line strikes with the
13 installation of flight diverters on new and selected existing transmission lines. Transmission line
14 poles and towers also provide perching substrate for raptors, which are predators on yellow-headed
15 blackbird. Although there is potential for transmission lines to result in increased perching
16 opportunities for raptors and result in increased predation pressure on yellow-headed blackbirds,
17 the existing network of transmission lines in the study area currently poses this risk for yellow-
18 headed blackbirds, and any incremental risk associated with the new transmission line corridors
19 would not be expected to affect the study area population. Therefore, it is assumed that the increase
20 in predation risk on yellow-headed blackbird from an increase in raptor perching opportunities is
21 minimal.

22 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
23 could result in injury or mortality of yellow-headed blackbird. AMM20 Greater Sandhill Crane
24 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
25 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
26 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
27 opportunities is considered minimal. Therefore, the construction and operation of new transmission
28 lines under Alternative 4 would not result in an adverse effect on yellow-headed
29 blackbird. Transmission line poles and towers also provide perching substrate for raptors, which
30 could result in increased predation pressure on yellow-headed blackbirds. The existing network of
31 transmission lines in the study area currently poses this risk for yellow-headed blackbirds, and any
32 incremental risk associated with the new transmission line corridors would not be expected to have
33 an adverse effect on yellow-headed blackbirds. Implementation of AMM20 Greater Sandhill Crane
34 would further minimize the risk for bird-power line strikes.

35 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
36 could result in injury or mortality of yellow-headed blackbird. AMM20 Greater Sandhill Crane
37 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
38 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
39 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
40 opportunities is considered minimal. The construction and operation of new transmission lines
41 under Alternative 4 would not substantially reduce the number or restrict the range of the species
42 and would therefore result in a less-than-significant impact on yellow-headed
43 blackbird. Transmission line poles and towers also provide perching substrate for raptors, which
44 could result in increased predation pressure on yellow-headed blackbirds. The existing network of
45 transmission lines in the study area currently poses this risk for yellow-headed blackbirds, and any
46 incremental risk associated with the new transmission line corridors would have a less-than-

1 ~~significant impact on yellow-headed blackbird. Implementation of AMM20 Greater Sandhill Crane~~
2 ~~would further minimize the risk for bird-power line strikes.~~

3 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

4 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated
5 with construction-related activities could result in temporary disturbances that affect yellow-
6 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater
7 than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (~~Draft BDCP~~
8 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
9 *Sandhill Crane*, Table 4 in Appendix D, Substantive BDCP Revisions, of this RDEIR/SEIS), although
10 there are no available data to determine the extent to which these noise levels could affect yellow-
11 headed blackbird. Indirect effects associated with construction include noise, dust, and visual
12 disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
13 Construction-related noise and visual disturbances could disrupt nesting and foraging behaviors,
14 and reduce the functions of suitable habitat which could result in an adverse effect on these species.
15 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
16 *Nesting Birds*, would be available to minimize adverse effects on active nests. The use of mechanical
17 equipment during water conveyance construction could cause the accidental release of petroleum or
18 other contaminants that could affect the species in the surrounding habitat. ~~AMM1-AMM7, including~~
19 ~~AMM2 Construction Best Management Practices and Monitoring, would minimize the likelihood of~~
20 ~~such spills from occurring.~~ The inadvertent discharge of sediment or excessive dust adjacent to
21 yellow-headed blackbird habitat could also have a negative effect on the species. Where nests are
22 located above open water, impacts of contamination, dust, and sediment in water could impact
23 fledglings directly, or affect aquatic insect prey, which is important for feeding young. AMM1-AMM7
24 would minimize the likelihood of spills from occurring and ensure that measures are in place to
25 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
26 work areas.

27 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
28 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and
29 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
30 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
31 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
32 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
33 mercury (see ~~BDCP~~ Chapter 3, *Conservation Strategy*, of the Draft BDCP for details of restoration).
34 Species sensitivity to methylmercury differs widely and there is a large amount of uncertainty with
35 respect to species-specific effects. A detailed review of the methylmercury issues associated with
36 implementation of the BDCP areis contained in Appendix XD, Substantive BDCP Revisions, of this
37 RDEIR/SDEIS. which The review includes an overview of the BDCP-related mechanisms that could
38 result in increased mercury in the food web, and how exposure to individual species may occur
39 based on feeding habits and where their habitat overlaps with the areas where mercury
40 bioavailability could increase. Increased methylmercury associated with natural community and
41 floodplain restoration could indirectly affect yellow-headed blackbird, via uptake in lower tropic
42 levels (as described in ~~the BDCP~~, Appendix 5.D, *Contaminants*, of the Draft BDCP).

43 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
44 into the foodweb, CM12 Methylmercury Management (as revised in Appendix D, Substantive BDCP
45 Revisions, in this RDEIR/SDEIS); is included to provide for site-specific evaluation for each

1 restoration project. On a project-specific basis, where high potential for methylmercury production
2 is identified that restoration design and adaptive management cannot fully address while also
3 meeting restoration objectives, alternate restoration areas will~~will~~be considered. CM-12
4 will~~will~~be implemented in coordination with other similar efforts to address mercury in the
5 Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This conservation
6 measure will~~will~~include the following actions.

- 7 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
8 mercury methylation and bioavailability
- 9 ● Define design elements that minimize conditions conducive to generation of methylmercury in
10 restored areas.
- 11 ● Define adaptive management strategies that can be implemented to monitor and minimize
12 actual postrestoration creation and mobilization of methylmercury.

13 ~~In addition, the potential mobilization or creation of methylmercury within the study area varies~~
14 ~~with site-specific conditions and would need to be assessed at the project level. CM12 Methylmercury~~
15 ~~Management contains provisions for project-specific Mercury Management Plans. Site-specific~~
16 ~~restoration plans that address the creation and mobilization of mercury, as well as monitoring and~~
17 ~~adaptive management as described in CM12 would be available to address the uncertainty of~~
18 ~~methylmercury levels in restored tidal marsh and potential impacts on yellow-headed blackbird.~~

19 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
20 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,
21 operation and maintenance of the water conveyance facilities, including the transmission facilities,
22 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed
23 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
24 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
25 effects on nesting individuals in addition to AMM1–AMM7.

26 The implementation of tidal natural communities restoration or floodplain restoration could result
27 in increased exposure of yellow-headed blackbird to methylmercury in restored tidal areas.
28 However, it is unknown what concentrations of methylmercury are harmful to these species and the
29 potential for increased exposure varies substantially within the study area. Implementation of CM12
30 which contains measures to assess the amount of mercury before project development, followed by
31 appropriate design and adaptation management, would minimize the potential for increased
32 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.~~Site-~~
33 ~~specific restoration plans that address the creation and mobilization of mercury, as well as~~
34 ~~monitoring and adaptive management as described in CM12, would address the uncertainty of~~
35 ~~methylmercury levels in restored tidal marsh in the study area and better inform potential impacts~~
36 ~~on yellow-headed blackbird. The site-specific planning phase of marsh restoration would be the~~
37 ~~appropriate place to assess the potential for risk of methylmercury exposure for yellow-headed~~
38 ~~blackbird, once site specific sampling and other information could be developed.~~

39 **CEQA Conclusion:** ~~In the absence of other conservation actions, noise and visual disturbance,~~ the
40 potential for hazardous spills, increased dust and sedimentation, and operations and maintenance of
41 the water conveyance facilities under Alternative 4 would represent an adverse effect. This impact
42 would be significant.~~have a less-than-significant impact on yellow-headed blackbird with the~~
43 ~~implementation~~The implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*

1 *Bird Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7, would reduce this impact to
2 a less-than-significant level.

3 The implementation of tidal natural communities restoration or floodplain restoration could result
4 in increased exposure of yellow-headed blackbird to methylmercury in restored tidal areas.
5 However, it is unknown what concentrations of methylmercury are harmful to these species and the
6 potential for increased exposure varies substantially within the study area. Implementation of CM12
7 which contains measures to assess the amount of mercury before project development, followed by
8 appropriate design and adaptation management, would minimize the potential for increased
9 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

10 Indirect effects of plan implementation would represent an adverse effect on yellow-headed
11 blackbird in the absence of other conservation measures. This would be a significant impact. With
12 AMM1-7, and CM12 in place, and with the implementation of Mitigation Measure BIO-75, indirect
13 effects of plan implementation would not result in a substantial adverse effect through habitat
14 modifications and would not substantially reduce the number or restrict the range of the species.
15 Therefore, indirect effects of plan implementation would have a less-than-significant impact on
16 yellow-headed blackbird. The implementation of tidal natural communities restoration or floodplain
17 restoration could result in increased exposure of yellow-headed blackbird to methylmercury.
18 However, it is unknown what concentrations of methylmercury are harmful to this species. Site-
19 specific restoration plans that address the creation and mobilization of mercury, as well as
20 monitoring and adaptive management as described in CM12, would better inform potential impacts
21 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area.

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 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**
26 **as a Result of Implementation of Conservation Components**

27 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–
28 2,678 acres of foraging habitat (Table 12-4-54). Based on hypothetical floodplain restoration,
29 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
30 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding
31 habitat (Table 12-4-54) resulting in the temporary loss of these habitats. Foraging yellow-headed
32 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is
33 inundated, as they do under the current flooding regime. However, this inundation could reduce the
34 availability of nesting habitat during years when flooding extends into the nesting season (past
35 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is
36 expected to restore a more natural flood regime in support of wetland and riparian vegetation types
37 that support nesting habitat.

38 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
39 foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-significant
40 impact on yellow-headed blackbird because inundation is expected to take place outside of the
41 breeding season, and although foraging habitat may be temporarily unavailable, birds would be
42 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 yellow-headed blackbird. Periodic inundation would have a less-than-
3 significant impact on yellow-headed blackbird because inundation is expected to take place outside
4 of the breeding season, and although foraging habitat would be temporarily unavailable, birds
5 would be expected to move to adjacent foraging habitat.

1 **Riparian Brush Rabbit**

2 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation
3 associations within the valley/foothill riparian natural community and adjacent grasslands. The
4 vegetation associations were selected based on a review of understory and overstory composition
5 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

6 Just until recently, the only known naturally occurring populations of riparian brush rabbits were
7 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland
8 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of
9 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-
10 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry
11 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury
12 pers. comm.). This is only the 2nd naturally occurring population documented outside of Caswell
13 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush
14 rabbit, to the extent information was available, included size and degree of isolation of habitat
15 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

16 Construction and restoration associated with Alternative 4 conservation measures would result in
17 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table
18 12-4-55. Full implementation of Alternative 4 would also include biological objectives over the term
19 of the BDCP to benefit the riparian brush rabbit ([BDCP-see Chapter 3, Conservation Strategy, of the](#)
20 [Draft BDCP](#)). The conservation strategy for the riparian brush rabbit involves protecting, restoring
21 or creating, and maintaining habitat and corridors near the largest remaining fragments of habitat
22 and extant populations; providing high-water refugia from flooding; and managing feral predators
23 (dogs and cats) in areas occupied by the species. The conservation measures that would be
24 implemented to achieve the biological goals and objectives are summarized below.

- 25 ● Provide a range of elevations in restored floodplains that transition from frequently flooded
26 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
27 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
28 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 29 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
30 between existing conservation lands (Objective L1.6, associated with CM3).
- 31 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
32 recolonization of vegetation, desirable natural community vegetation is regenerated, and
33 structural diversity is promoted, or implement management actions that mimic those natural
34 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 35 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
36 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
37 associated with CM3–CM8, and CM11).
- 38 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
39 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
40 with CM3 and CM7).
- 41 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
42 (Objective VFRNC1.2, associated with CM3).

- 1 • Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
2 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
3 with CM5, CM7, and CM11).
 - 4 • Of the 750 acres of protected valley/foothill riparian natural community protected under
5 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined
6 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous
7 with occupied habitat (Objective RBR1.1, associated with 3).
 - 8 • Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,
9 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are
10 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat
11 (Objective RBR1.2, associated with CM3, CM7, and CM11).
 - 12 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
13 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian
14 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or
15 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat
16 (Objective 1.3, associated with CM3, CM7, and CM11).
 - 17 • Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit
18 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,
19 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that
20 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
 - 21 • In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control
22 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,
23 associated with CM11).
 - 24 • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of
25 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side
26 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for
27 riparian brush rabbit (Objective RBR1.6m associated with CM3 and CM8).
- 28 As explained below, with the restoration and protection of these amounts of habitat, in addition to
29 the AMMs to reduce potential effects, impacts on riparian brush rabbit would not be adverse for
30 NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Riparian	315	315	14	14	NA	NA
	Grassland	124170	124170	5457	5457	NA	NA
Total Impacts CM1		12718 <u>5</u>	12718 <u>5</u>	5561	5561	NA	NA
CM2–CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
Total Impacts CM2–CM18		0	106	0	55	0	687
TOTAL IMPACTS		12718 <u>5</u>	23329 <u>1</u>	5561	1101 <u>16</u>	0	687

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

3

4 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**
5 **Rabbit**

6 Alternative 4 conservation measures would result in the permanent and temporary loss of up to ~~101~~
7 ~~116~~ acres of riparian habitat and ~~242-291~~ acres of associated grassland habitat for the riparian
8 brush rabbit in the study area (Table 12-4-55). ~~The hypothetical footprint for levee construction~~
9 ~~under 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.

- 15 • *CM1 Water Facilities and Operation*: Development of Alternative 4 water conveyance facilities
16 would result in the permanent removal of approximately ~~3-15~~ acres of riparian habitat and
17 ~~124-171~~ acres of associated grassland habitat and in the temporary removal of ~~1-3~~ ~~acres~~
18 of riparian habitat and ~~54-57~~ acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-
19 4-55). The riparian habitat that would be removed is of low value for the riparian brush rabbit
20 as it consists of several small, isolated patches surrounded by agricultural lands northeast of
21 Clifton Court Forebay. The associated grasslands are also of low value for the species: They
22 consist of long, linear strips that abut riparian habitat, but extend several miles from the

1 riparian habitat and, therefore, provide few if any opportunities for adjacent cover. Trapping
2 efforts conducted for the riparian brush rabbit in this area were negative ([BDCP-see Appendix](#)
3 [3.E, Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat, of the Draft](#)
4 [BDCP](#)). Refer to the Terrestrial Biology Map-~~B~~book [in Appendix A of this RDEIR/SDEIS](#) for a
5 detailed view of Alternative 4 construction locations.

- 6 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
7 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres
8 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The
9 riparian habitat that would be removed consists of relatively small and isolated patches along
10 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts
11 Island areas, and several small patches along the San Joaquin River. The habitat that would be
12 removed is not adjacent to any existing conserved lands, and is several miles north and
13 northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut
14 (Williams et al. 2002). Although the final footprint for tidal natural communities restoration
15 would differ from the hypothetical footprint, compliance monitoring would be implemented to
16 ensure that acreage limits are not exceeded and the measures described in *AMM25 Riparian*
17 *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid
18 removal of any habitat occupied by the riparian brush rabbit.
- 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
20 restoration would result in the permanent removal of approximately 43 acres of riparian habitat
21 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late
22 longterm. Levee construction would also result in the temporary removal of 35 acre riparian
23 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are
24 considered temporary, five years to several decades may be required for ecological succession
25 to occur and for restored riparian habitat to replace the function of habitat that has been
26 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small
27 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous
28 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for
29 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the
30 Interstate 5/Interstate 205 interchange.

31 Although the final floodplain restoration design would differ from the hypothetical footprint
32 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the
33 general area of the riparian brush rabbit population. Implementation of adaptive management
34 described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed as a
35 result of floodplain restoration does not exceed the maximum allowable habitat loss for this
36 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. Enhancement and management actions in riparian
41 brush rabbit habitat within the reserve system may include invasive plant removal, planting and
42 maintaining vegetation to improve and sustain habitat characteristics for the species, and
43 creating and maintaining flood refugia. These activities are expected to have minor adverse
44 effects on available riparian brush rabbit habitat and are expected to result in overall
45 improvements to and maintenance of riparian brush rabbit habitat values over the term of the

1 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
2 and minimized through the AMMs listed below.

3 Passive recreation in the reserve system could result in disturbance of individual riparian brush
4 rabbits foraging in the ecotone between riparian and adjacent open habitats. However, *AMM37*
5 *Recreation* limits trail development adjacent to riparian corridors within the range of the
6 riparian brush rabbit. With this minimization measure in place, recreation related effects on the
7 riparian brush rabbit are expected to be minimal.

- 8 • Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to
9 adversely affect the riparian brush rabbit because the species is not expected to occur in the
10 vicinity of proposed facilities.
- 11 • Injury and direct mortality: Water conveyance facility construction is not is not likely to result in
12 injury or mortality of individual riparian brush rabbit because the species is not likely to be
13 present in the areas that would be affected by this activity, based on live trapping results ([BDCP](#)
14 [see Appendix 3.E, Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat, of](#)
15 [the Draft BDCP](#)). Tidal natural communities restoration would not result in injury or mortality of
16 the riparian brush rabbit because tidal natural communities restoration projects would be
17 designed to avoid occupied riparian brush rabbit habitat and, if that is not possible, rabbits
18 would be trapped and relocated as described in AMM25 (see [Appendix 3.C, Avoidance and](#)
19 [Minimization Measures, of the Draft BDCP BDCP Appendix 3.C](#)). Activities associated with
20 construction of setback levees for floodplain restoration could result in injury or mortality of
21 riparian brush rabbits: however, preconstruction surveys, construction monitoring, and other
22 measures would be implemented to avoid and minimize injury or mortality of this species
23 during construction (AMM25).

24 The following paragraphs summarize the combined effects discussed above and describe other
25 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
26 also 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. Alternative 4 would result in permanent
32 and temporary effects combined on [4-19](#) acres of riparian habitat and [178-227](#) acres of grassland
33 habitat for riparian brush rabbit in the near-term as a result of construction of the water conveyance
34 facilities (CM1). The habitat would be lost in the valley/foothill riparian and grassland natural
35 communities. Most of the near-term loss of riparian brush rabbit habitat would be in an area
36 unlikely to be occupied by the species in CZ 8. Habitat loss in CZ 7, in areas known or likely to be
37 occupied, would occur during the early long-term and late long-term timeframes. Riparian
38 restoration would be phased to minimize temporal habitat loss. There would be no near-term losses
39 resulting from CM2–CM18.

40 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
41 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3,
42 [Conservation Strategy](#), of the [Draft BDCP](#) would be 1:1 for restoration and protection of the
43 valley/foothill riparian natural community, and 2:1 for protection of grassland. Using these ratios
44 would indicate that [4-19](#) acres of riparian habitat should be restored, [4-19](#) acres of riparian habitat

1 should protected, and ~~356~~ 454 acres of grassland should be protected for riparian brush rabbit to
2 mitigate near-term losses.

3 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and
4 an unknown number of associated acres of grassland and protection of 750 acres of riparian
5 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (see Table 3-4 in
6 Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). In addition, the species-specific
7 biological goals and objectives (RBR1.1–RBR1.6) would inform the near-term protection and
8 restoration efforts. The natural community restoration and protection activities are expected to be
9 concluded during the first 10 years of plan implementation, which is close enough in time to the
10 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are
11 more than sufficient to support the conclusion that the near-term effects of Alternative 4 would be
12 not be adverse under NEPA, because the number of acres required to meet the typical ratios
13 described above would be only 4-19 acres of riparian habitat restored, 4-19 acres protected, and ~~356~~
14 454 acres of grassland protected.

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, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*
20 *Communities, AMM25 Riparian Woodrat and Riparian Brush Rabbit, and AMM37 Recreation*. These
21 AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats and
22 species adjacent to work areas and storage sites. The AMMs are described in detail in Appendix 3.C,
23 Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is
24 provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS BDCP Appendix 3.C,
25 Avoidance and Minimization Measures.

26 **Late Long-Term Timeframe**

27 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
28 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 4 would
29 result in permanent and temporary effects combined on ~~401~~ 116 acres of modeled riparian habitat
30 and ~~243~~ 291 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and 98%
31 of the riparian and grassland modeled habitat in CZ 6, CZ 7, and CZ 8. Habitat lost in CZ 6 and CZ 8 is
32 fragmented, isolated, and unlikely to support the species. Habitat would also be lost in areas in CZ 7
33 that provide high-value habitat for the species.

34 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
35 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
36 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to
37 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or
38 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
39 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
40 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
41 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
42 area of protected and restored riparian natural community than what currently exists in CZ 7 and
43 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
44 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at

1 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
2 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
3 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines
4 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
5 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
6 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

7 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the Plan
8 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
9 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
10 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
11 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
12 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
13 on the landward side of levees adjacent to restored floodplain will be restored or protected as
14 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

15 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
16 needed, the floodplains will transition from areas that flood frequently (e.g., every 1 to 2 years) to
17 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
18 flooded areas will provide refuge for the riparian brush rabbit during most years. The Plan would
19 also create and maintain mounds, levee sections, or other high areas in restored and protected
20 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the
21 riparian brush rabbit (~~BDCP~~ see Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit*
22 *and Riparian Woodrat, of the Draft BDCP*). Additionally, nonnative predators that are known to prey
23 on riparian brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored
24 riparian areas that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as
25 needed (CM11).

26 The BDCP's beneficial effects analysis (~~BDCP~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
27 *Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
28 above, as well as the restoration of valley/foothill riparian and grassland that could overlap with the
29 species model, would result in the restoration of 800 acres of riparian and 79 acres of grassland
30 modeled habitat for riparian brush rabbit. In addition, protection of valley/foothill riparian and
31 grassland could overlap with the species model and would result in the protection of 200 acres of
32 riparian and 317 acres of grassland riparian brush rabbit modeled habitat.

33 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat and potential mortality
34 under Alternative 4 would not be an adverse effect because there is little likelihood of riparian brush
35 rabbits being present and because the BDCP has committed to protecting and restoring the acreage
36 required to meet the typical mitigation ratios described above. In the late long-term, the losses of
37 riparian brush rabbit riparian and grassland habitat associated with Alternative 4, in the absence of
38 other conservation actions, would represent an adverse effect as a result of habitat modification and
39 potential direct mortality of a special-status species. However, with habitat protection and
40 restoration associated with the conservation components, guided by landscape-scale goals and
41 objectives and by AMM1–AMM6, AMM10, AMM25, and AMM37, the effects of Alternative 4 as a
42 whole on riparian brush rabbit would 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 or restoration in an appropriate timeframe to ensure that the
6 effects of construction would not be significant under CEQA.

7 Alternative 4 would result in permanent and temporary effects combined on ~~4-19~~ acres of riparian
8 habitat and ~~178-227~~ acres of grassland habitat for riparian brush rabbit in the near-term as a result
9 of construction of the water conveyance facilities (CM1). The habitat would be lost in the
10 valley/foothill riparian and grassland natural communities. Most of the near-term loss of riparian
11 brush rabbit habitat would be in an area unlikely to be occupied by the species in CZ 8. Habitat loss
12 in CZ 7, in areas known or likely to be occupied, would occur during the early long-term and late
13 long-term timeframes. Riparian restoration would be phased to minimize temporal habitat loss.
14 There would be no near-term losses resulting from CM2–CM18.

15 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
16 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3.
17 *Conservation Strategy*, of the *Draft BDCP* would be 1:1 for restoration and protection of the
18 valley/foothill riparian natural community, and 2:1 for protection of grassland. Using these ratios
19 would indicate that ~~4-19~~ acres of riparian habitat should be restored, ~~4-19~~ acres of riparian habitat
20 should protected, and ~~356-454~~ acres of grassland should be protected for riparian brush rabbit to
21 mitigate CM1 losses.

22 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and
23 an unknown number of associated acres of grassland and protection of 750 acres of riparian
24 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (see Table 3-4 in
25 Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*). In addition, the species-specific
26 biological goals and objectives (RBR1.1-RBR1.6) would inform the near-term protection and
27 restoration efforts. The natural community restoration and protection activities are expected to be
28 concluded during the first 10 years of plan implementation, which is close enough in time to the
29 occurrence of impacts to constitute adequate mitigation for CEQA purposes. These commitments are
30 more than sufficient to support the conclusion that the near-term effects of Alternative 4 would be
31 less than significant under CEQA, because the number of acres required to meet the typical ratios
32 described above would be only ~~4-19~~ acres of riparian habitat restored, ~~4-19~~ acres protected, and ~~356~~
33 ~~454~~ acres of grassland protected.

34 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.
35 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats
36 and species adjacent to work areas. The AMMs are described in detail in *Appendix 3.C, Avoidance*
37 *and Minimization Measures, of the Draft BDCP, and an updated version of AMM–6 is provided in*
38 *Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS* *BDCP Appendix 3.C, Avoidance and*
39 *Minimization Measures*.

40 **Late Long-Term Timeframe**

41 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
42 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 4 would
43 result in permanent and temporary effects combined on ~~101-116~~ acres of modeled riparian habitat

1 and ~~243~~291 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and ~~89~~89%
2 of the riparian and grassland modeled habitat.

3 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
4 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
5 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to
6 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or
7 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
8 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
9 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
10 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
11 area of protected and restored riparian natural community than what currently exists in CZ 7 and
12 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
13 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at
14 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
15 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
16 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines
17 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
18 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
19 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

20 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the Plan
21 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
22 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
23 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
24 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
25 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
26 on the landward side of levees adjacent to restored floodplain would be restored or protected as
27 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

28 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
29 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to
30 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
31 flooded areas would provide refuge for the riparian brush rabbit during most years. The Plan would
32 also create and maintain mounds, levee sections, or other high areas in restored and protected
33 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the
34 riparian brush rabbit (~~BDCP-see~~ Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit
35 and Riparian Woodrat, of the Draft BDCP*). Additionally, nonnative predators that are known to prey
36 on riparian brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored
37 riparian areas that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as
38 needed (CM11).

39 The BDCP's beneficial effects analysis (~~BDCP~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife and
40 Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
41 above, as well as the restoration of valley/foothill riparian and grassland that could overlap with the
42 species model, would result in the restoration of 800 acres of riparian and 79 acres of grassland
43 modeled habitat for riparian brush rabbit. In addition, protection of valley/foothill riparian and
44 grassland could overlap with the species model and would result in the protection of 200 acres of
45 riparian and 317 acres of grassland riparian brush rabbit modeled habitat.

1 Only a small proportion of the habitat losses would be considered occupied and of high-value.
2 Alternative 4 conservation measures provide for large acreages of riparian brush rabbit riparian and
3 grassland habitat to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,
4 AMM25, and AMM37, which are directed at minimizing or avoiding potential effects during
5 construction and operation of the conservation measures. Overall, the BDCP would provide a
6 substantial net benefit to the riparian brush rabbit through the increase in available habitat and
7 habitat in protected status.

8 Considering the habitat restoration and protection associated with CM3,-CM7, CM8, and CM11,
9 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,
10 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality
11 of riparian brush rabbit as a result of implementing Alternative 4 would not represent a **substantial**
12 **adverse effects/significant impact** through habitat modifications and would not substantially reduce
13 the number or restrict the range of the species. The loss of habitat and potential mortality of riparian
14 brush rabbits would be a less-than-significant impact under CEQA.

15 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

16 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of
17 modeled riparian brush rabbit riparian habitat and of associated grassland habitat in the study area.
18 These construction activities would include water conveyance (including transmission line)
19 construction in CZ 8, tidal natural communities restoration construction, and construction of
20 setback levees. Water conveyance construction would potentially affect acres of adjacent riparian
21 habitat and of associated grassland habitat: this construction would occur in CZ 8 where there is
22 suitable habitat for the species but surveys by ESRP did not indicate the species is present in this
23 area; therefore, the potential for adverse noise and visual effects from conveyance facility
24 construction would be minimal. Tidal natural communities restoration construction would also
25 potentially affect adjacent riparian habitat and associated grassland habitat for this species:
26 however, adverse effects on the species are unlikely because tidal natural communities restoration
27 projects would be sited to avoid areas occupied by riparian brush rabbit. The activity most likely to
28 result in noise and visual disturbance to riparian brush rabbit is the construction of setback levees
29 for floodplain restoration, which would take place in CZ 7, where the species is known to occur. The
30 use of mechanical equipment during construction might cause the accidental release of petroleum or
31 other contaminants that would affect the riparian brush rabbit in adjacent habitat, if the species is
32 present.

33 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 4
34 would avoid the potential for substantial adverse effects on riparian brush rabbits, either indirectly
35 or through habitat modifications or result in a substantial reduction in numbers or a restriction in
36 the range of riparian brush rabbits. Therefore, indirect effects of Alternative 4 would not have an
37 adverse effect on riparian brush rabbit.

38 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
39 as construction-related noise and visual disturbances could affect riparian brush rabbit in riparian
40 and grassland habitats. The use of mechanical equipment during construction could cause the
41 accidental release of petroleum or other contaminants that could affect riparian brush rabbit. The
42 inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat could
43 also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10, AMM25,
44 and AMM37 as part of Alternative 4, the BDCP would avoid **and minimize** the potential for

1 ~~substantial adverse effects~~ **significant impacts** on riparian brush rabbits, either indirectly or through
2 habitat modifications and would not result in a substantial reduction in numbers or a restriction in
3 the range of riparian brush rabbits. Indirect effects of Alternative 4 would have a less-than-
4 significant impact on riparian brush rabbit.

5 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of**
6 **Implementation of Conservation Components**

7 *CM5 Seasonally inundated floodplain restoration* is the only covered activity expected to result in
8 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate
9 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres
10 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the
11 riparian brush rabbit. The area between existing levees that would be breached and the newly
12 constructed setback levees would be inundated through seasonal flooding. The potentially
13 inundated areas consist of high-value habitat for the species: although they consist of small patches
14 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous
15 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would
16 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to
17 higher elevation areas that flood infrequently (e.g., every 10 years or more).

18 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian
19 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of
20 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that
21 would be seasonally flooded based on the hypothetical restoration footprint.

22 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of
23 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic
24 inundation on the riparian brush rabbit would be minimized through construction and maintenance
25 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing
26 Alternative 4, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to
27 result in substantial adverse effects on riparian brush rabbit, either directly or through habitat
28 modifications and would not result in a substantial reduction in numbers or a restriction in the
29 range of riparian brush rabbits. Therefore, Alternative 4 would not adversely affect the species.

30 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small
31 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of
32 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,
33 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
34 flooding promotes the germination and establishment of many native riparian plants. In the late
35 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to
36 the establishment of high-value habitat for covered riparian species, such as the riparian brush
37 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the
38 edges of seasonally inundated habitat.

39 The ~~adverse effects~~ **significant impacts** of periodic inundation on the riparian brush rabbit would be
40 minimized through construction and maintenance of flood refugia to allow riparian brush rabbits to
41 escape inundation. Therefore, implementing Alternative 4, including AMM1–AMM7, AMM10,
42 AMM25, and AMM37, would not be expected to result in ~~substantial adverse effects~~ **significant**
43 **impacts** on riparian brush rabbit, either directly or through habitat modifications and would not
44 result in a substantial reduction in numbers or a restriction in the range of riparian brush rabbits.

1 Periodic inundation of riparian and grassland habitat for riparian brush rabbit under Alternative 4
2 would have a less-than-significant impact on the species.

3 **Riparian Woodrat**

4 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances
5 from the valley/foothill riparian natural community, geographically constrained to the south Delta
6 portion of the BDCP area in CZ 7, south of State Route 4 and Old River Pipeline along the Stanislaus,
7 San Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise
8 Cut, Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded
9 from the riparian woodrat habitat model due to a lack of trees or riparian corridors that were too
10 narrow. Factors considered in assessing the value of affected habitat for the riparian woodrat, to the
11 extent that information is available, include habitat patch size and connectivity.

12 The riparian woodrat is not known to occur in the study area. The only verified extant population of
13 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell
14 Memorial State Park along the Stanislaus River (Williams 1986:1–112; Williams 1993). Riparian
15 woodrat may occur in small patches of valley oak riparian forest along the San Joaquin River from
16 the southern tip of the study area north to approximately the Interstate 5 overcrossing near Lathrop
17 (Figure 12-47).

18 Construction and restoration associated with Alternative 4 conservation measures would result in
19 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-
20 4-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural
21 communities could affect modeled riparian woodrat habitat. However, because the species is not
22 known to occur in the study area it is not expected to be affected by BDCP actions unless the species
23 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 4
24 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat
25 (~~BDCP-see~~ Chapter 3, *Conservation Strategy, of the Draft BDCP*). The conservation strategy for the
26 riparian woodrat involves providing opportunities for population expansion into the Plan Area from
27 adjacent lands to the south and southeast. The strategy focuses on restoring and maintaining
28 suitable habitat at the southernmost end of CZ 7, providing connectivity with existing populations to
29 the south and southeast, and creating and maintaining flood refugia. This conservation approach is
30 consistent with the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles
31 (~~BDCP-see~~ Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat,*
32 *of the Draft BDCP*). The conservation measures that would be implemented to achieve the biological
33 goals and objectives are summarized below.

- 34 • Provide a range of elevations in restored floodplains that transition from frequently flooded
35 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
36 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
37 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 38 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
39 between existing conservation lands (Objective L1.6, associated with CM3).
- 40 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
41 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
42 associated with CM3-CM8, and CM11).

- 1 • Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres
2 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with
3 CM3 and CM7).
- 4 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
5 (Objective VFRNC1.2, associated with CM3).
- 6 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
7 overlap among vegetation components and over adjacent riverine channels, freshwater
8 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 9 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
10 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the
11 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak
12 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially
13 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).
- 14 • Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored
15 under Objective RW1.1 through the retention, construction, and/or restoration of high-ground
16 habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective
17 RW1.2, associated with CM7 and CM11).

18 As explained below, with the restoration and protection of these amounts of habitat, in addition to
19 implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be
20 adverse for NEPA purposes and would be less than significant for CEQA purposes.

21 **Table 12-4-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 4**
22 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Riparian	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Riparian	0	51	0	33	0	203
Total Impacts CM2–CM18		0	51	0	33	0	203
TOTAL IMPACTS		0	51	0	33	0	203

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

1 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

2 Alternative 4 conservation measures would result in the permanent loss of up to 51 acres of habitat
3 and temporary loss of up to 33 acres of modeled habitat for riparian woodrat (Table 12-4-56).
4 Construction of Alternative 4 water conveyance facilities (CM1) would not affect modeled habitat;
5 however, tidal natural communities restoration (CM4) and seasonally inundated floodplain
6 restoration (CM5) would remove habitat. Each of these individual activities is described below. A
7 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the
8 individual conservation measure discussions.

- 9
- 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
25 proximity to each other along the San Joaquin River. There are two species occurrences
26 immediately south of CZ 7, one of which is less than 1.5 mile from the southernmost patch of
27 riparian habitat potentially affected by levee construction.

27 The final floodplain restoration design would differ from the hypothetical footprint used for this
28 effects analysis. However, monitoring and adaptive management described in *CM11 Natural*
29 *Communities Enhancement and Management*. And AMM25 would ensure that riparian woodrat
30 habitat permanently removed does not exceed the amount estimated based on the hypothetical
31 footprint. Habitat loss is expected to be lower than 41 acres because sites would be selected and
32 restoration designed to minimize effects on the riparian woodrat. If natural flooding is
33 insufficient to maintain appropriate riparian woodrat vegetation structure, the vegetation
34 would be actively managed to provide suitable habitat structure as described in *CM11 Natural*
35 *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
- 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 BDCP protected
43 habitats may result in localized ground disturbances that could temporarily remove small
44 amounts of riparian woodrat habitat. Enhancement and management actions in riparian
45 woodrat habitat within the reserve system may include invasive plant removal, planting and
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-see](#)
16 [Appendix 3.E, Conservation Principles for the Riparian Woodrat and Riparian Brush Rabbit, of the](#)
17 [Draft BDCP](#)). Tidal natural communities restoration would not result in injury or mortality of
18 riparian woodrats because, under AMM25, tidal natural communities restoration projects would
19 be designed to avoid occupied riparian woodrat habitat and if that is not possible to trap and
20 relocate the species. Activities associated with construction of setback levees for floodplain
21 restoration could result in injury or mortality of riparian woodrats; however, preconstruction
22 surveys, construction monitoring, and other measures would be implemented under AMM25 to
23 avoid and minimize injury or mortality of this species during construction, as described in
24 [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP-BDCPBDCP Appendix 3.C.](#)
25 If occupied riparian woodrat habitat cannot be avoided, mortality would be avoided through
26 implementation of a trapping and relocation program. The program would be developed in
27 coordination with USFWS, and relocation would be to a site approved by USFWS prior to
28 construction activities.

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

32 ***Near-Term Timeframe***

33 Because water conveyance facilities construction is being evaluated at the project level, the near-
34 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
35 protection or restoration in an appropriate timeframe to ensure that the construction effects would
36 not be adverse under NEPA.

37 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11
38 could have minor adverse effects on available riparian woodrat habitat, and activities associated
39 with construction of setback levees for floodplain restoration could result in injury or mortality of
40 riparian woodrats.

41 The BDCP has committed to near-term restoration of 800 acres of ~~riparian~~riparian (Objective
42 VFRNC1.1) and protection of 750 acres of riparian (Objective VFRNC1.2) ([see](#) Table 3-4 in Chapter 3,
43 [Description of Alternatives, of this RDEIR/SDEIS](#)). In addition, the species-specific biological goals
44 and objectives (RW1.1 and RW1.2) ~~would~~ would inform the near-term protection and restoration

1 efforts. The natural community restoration and protection activities are expected to be concluded
2 during the first 10 years of plan implementation, which is close enough in time to the occurrence of
3 impacts to constitute adequate mitigation for NEPA purposes. These commitments are more than
4 sufficient to support the conclusion that the near-term effects of Alternative 4 would be not be
5 adverse under NEPA, because no riparian woodrat habitat would be lost and there is only limited
6 potential for minor adverse effects on woodrats or its habitat from implementation of CM11.

7 These effects cannot be quantified, but are expected to be minimal and would be avoided and
8 minimized through the BDCP's commitment to *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, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*
13 *Communities, and AMM25 Riparian Woodrat and Riparian Brush Rabbit. The AMMs are described in*
14 *detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated](#)*
15 *version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS.*
16 ~~*Appendix 3.C, Avoidance and Minimization Measures.*~~

17 **Late Long-Term Timeframe**

18 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
19 Alternative 4 as a whole would result in the permanent loss and temporary removal of 84 acres of
20 modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is
21 considered occupied.

22 Objective RW1.1 requires at least 300 acres of riparian habitat that meets the ecological
23 requirements of the riparian woodrat (e.g., dense willow understory and oak overstory) and that is
24 adjacent to or facilitates connectivity with existing occupied or potentially occupied habitat to be
25 restored in CZ 7. The conserved habitat would also be part of a larger, more contiguous, and less
26 patchy area of protected and restored riparian natural community than what currently exists in CZ 7
27 and would be contiguous with existing modeled riparian woodrat habitat. The species-specific
28 objective further requires that the 300 acres of restored riparian habitat meet more specific
29 ecological requirements of riparian woodrat (e.g., dense willow understory and oak overstory).
30 Additionally, assuming the protected riparian natural community would provide riparian woodrat
31 habitat proportional to the amount of modeled habitat in this natural community in the Plan Area
32 (12% of the riparian natural community in the Plan Area is modeled riparian woodrat habitat), the
33 protection of 750 acres of riparian natural community (CM3) would provide an estimated 90 acres
34 of protected riparian woodrat habitat that is comparable to or of higher value than existing modeled
35 grassland habitat. All riparian protection would occur during the near-term period to offset early
36 riparian losses.

37 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and
38 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for
39 the riparian woodrat (~~BDCP-see~~ [Appendix 3.E, Conservation Principles for the Riparian Brush Rabbit](#)
40 [and Riparian Woodrat, of the Draft BDCP](#)). In addition, the restored floodplains would transition
41 from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every
42 10 years or more) (Objective L1.5): these infrequently flooded areas would provide refuge for the
43 riparian woodrat during most years.

1 The BDCP's beneficial effects analysis (~~BDCP~~ Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
3 above, as well as the restoration of valley/foothill riparian that could overlap with the species
4 model, would result in the restoration of 300 acres of modeled habitat for riparian woodrat. In
5 addition, protection of valley/foothill riparian could overlap with the species model and would
6 result in the protection of 90 acres riparian woodrat modeled habitat.

7 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
8 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
9 opportunities for northward expansion of the species into the study area. Implementation of
10 Alternative 4 conservation measures is not expected to adversely affect the riparian woodrat for the
11 following reasons.

- 12 • There are no riparian woodrat occurrences in the Plan Area.
- 13 • The habitat that would be removed consists of small patches that are of moderate value for the
14 species.
- 15 • The habitat that would be removed permanently is a small proportion of the total habitat in the
16 Plan Area (2%).
- 17 • Avoidance and minimization measures would be implemented to avoid injury or mortality of
18 riparian woodrats, and to minimize loss of occupied habitat.
- 19 • Floodplain restoration would be designed to provide flood refugia so that flooding would not
20 adversely affect any riparian woodrats that occupy restored floodplains.

21 **NEPA Effects:** Alternative 4 would provide a substantial benefit to the riparian woodrat through the
22 net increase in available habitat and a net increase of habitat in protected status. These protected
23 areas would be managed and monitored to support the species. The affected habitat is currently
24 unoccupied and habitat removal is not expected to result in a discernible change in the abundance
25 or distribution of riparian woodrat should they occupy study area habitats. Should the species be
26 detected in the study area, implementation of AMM1-AMM7, AMM10, and AMM25 would avoid and
27 minimize the effects of conservation component construction and implementation. Therefore, the
28 loss of habitat and potential mortality of individuals would not have an adverse effect on riparian
29 woodrat under Alternative 4.

30 **CEQA Conclusion:**

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 be less than significant for CEQA purposes.

36 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11
37 could have minor ~~adverse effects~~significant impacts on available riparian woodrat habitat, and
38 activities associated with construction of setback levees for floodplain restoration could result in
39 injury or mortality of riparian woodrats.

40 The BDCP has committed to near-term restoration of 800 acres of riparian habitat (Objective
41 VFRNC1.1) and protection of 750 acres of riparian habitat (Objective VFRNC1.2) (see Table 3-4 in

1 Chapter 3, [Description of Alternatives, of this RDEIR/SDEIS](#)). In addition, the species-specific
2 biological goals and objectives (RW1.1 and RW1.2) would inform the near-term protection and
3 restoration efforts. The natural community restoration and protection activities are expected to be
4 concluded during the first 10 years of plan implementation, which is close enough in time to the
5 occurrence of impacts to constitute adequate mitigation for CEQA purposes. The Plan also contains
6 commitments to implement AMM1–AMM7, AMM10, and AMM25, which include elements that avoid
7 or minimize the risk of affected habitats and species adjacent to work areas. The AMMs are
8 described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an](#)
9 [updated version of AMM–6 is provided in Appendix D, Substantive BDCP Revisions, of this](#)
10 [RDEIR/SDEIS/BDCP Appendix 3.C, Avoidance and Minimization Measures](#).

11 These commitments are more than sufficient to support the conclusion that the near-term effects of
12 Alternative 4 would be less than significant under CEQA, because no riparian woodrat habitat would
13 be lost and there is only limited potential for minor ~~adverse effects~~significant impacts on woodrats
14 or its habitat from implementation of CM11. [No mitigation would be required](#).

15 **Late Long-Term Timeframe**

16 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
17 Alternative 4 as a whole would result in the permanent loss and temporary removal of 84 acres of
18 modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is
19 considered occupied.

20 Objective RW1.1 requires at least 300 acres of riparian habitat that meets the ecological
21 requirements of the riparian woodrat (e.g., dense willow understory and oak overstory) and that is
22 adjacent to or facilitates connectivity with existing occupied or potentially occupied habitat to be
23 restored in CZ 7. The conserved habitat would also be part of a larger, more contiguous, and less
24 patchy area of protected and restored riparian natural community than what currently exists in CZ 7
25 and would be contiguous with existing modeled riparian woodrat habitat. The species-specific
26 objective further requires that the 300 acres of restored riparian habitat meet more specific
27 ecological requirements of riparian woodrat (e.g., dense willow understory and oak overstory).
28 Additionally, assuming the protected riparian natural community would provide riparian woodrat
29 habitat proportional to the amount of modeled habitat in this natural community in the Plan Area
30 (12% of the riparian natural community in the Plan Area is modeled riparian woodrat habitat), the
31 protection of 750 acres of riparian natural community (CM3) would provide an estimated 90 acres
32 of protected riparian woodrat habitat that is comparable to or of higher value than existing modeled
33 grassland habitat. All riparian protection would occur during the near-term period, to offset early
34 riparian losses.

35 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and
36 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for
37 the riparian woodrat (~~BDCP-see~~ [Appendix 3.E, Conservation Principles for the Riparian Brush Rabbit](#)
38 [and Riparian Woodrat, of the Draft BDCP](#)). In addition, the restored floodplains would transition
39 from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every
40 10 years or more) (Objective L1.5): these infrequently flooded areas would provide refuge for the
41 riparian woodrat during most years.

42 The BDCP's beneficial effects analysis (~~BDCP~~ Chapter 5, Section 5.6, [Effects on Covered Wildlife and](#)
43 [Plant Species, of the Draft BDCP](#)) estimates that the restoration and protection actions discussed
44 above, as well as the restoration of valley/foothill riparian that could overlap with the species

1 model, would result in the restoration of 300 acres of modeled habitat for riparian woodrat. In
2 addition, protection of valley/foothill riparian could overlap with the species model and would
3 result in the protection of 90 acres riparian woodrat modeled habitat.

4 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
5 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
6 opportunities for northward expansion of the species into the study area Implementation of
7 Alternative 4 conservation measures is not expected to ~~adversely affects~~significantly impact the
8 riparian woodrat for the following reasons.

- 9 ● There are no riparian woodrat occurrences in the Plan Area.
- 10 ● The habitat that would be removed consists of small patches that are of moderate value for the
11 species.
- 12 ● The habitat that would be removed permanently is a small proportion of the total habitat in the
13 Plan Area (2%).
- 14 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of
15 riparian woodrats, and to minimize loss of occupied habitat.
- 16 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not
17 adversely affect any riparian woodrats that occupy restored floodplains.

18 Alternative 4 would provide a substantial benefit to the riparian woodrat through the net increase in
19 available habitat and a net increase of habitat in protected status. These protected areas would be
20 managed and monitored to support the species. The affected habitat is currently unoccupied and
21 habitat removal is not expected to result in a discernible change in the abundance or distribution of
22 riparian woodrat should they occupy study area habitats. Should the species be detected in the
23 study area, implementation of AMM1–AMM7, AMM10, and AMM25 would avoid and minimize the
24 effects of conservation component construction and implementation. Therefore, the loss of habitat
25 and potential mortality of individuals under Alternative 4 would not have a significant impact on
26 riparian woodrat. No mitigation would be required.

27 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

28 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of
29 modeled habitat for riparian woodrat. These effects are related construction activities associated
30 with tidal natural communities restoration construction and construction of setback levees. Indirect
31 effects on the species from construction associated with tidal natural communities restoration are
32 unlikely because, under AMM25, tidal natural communities restoration projects would be sited to
33 avoid areas occupied by riparian woodrat. The activity most likely to result in noise and visual
34 disturbance to riparian woodrat would be the construction of setback levees. These adverse effects
35 would be minimized through implementation of AMM1–AMM7, AMM10, and AMM25.

36 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 4
37 would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly or
38 through habitat modifications or result in a substantial reduction in numbers or a restriction in the
39 range of riparian woodrats. Therefore, indirect effects of Alternative 4 would not have an adverse
40 effect on riparian woodrat.

1 **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation
2 measure construction and implementation could impact riparian woodrat and its habitat. AMM1–
3 AMM7, AMM10, and AMM25 implemented under Alternative 1A would avoid and minimize the
4 impact and result in a less-than-significant impact. No mitigation would be required.

5 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of**
6 **Implementation of Conservation Components**

7 *CM5 Seasonally inundated floodplain restoration* is the only covered activity expected to result in
8 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic
9 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the
10 Plan Area). The area between existing levees that would be breached and the newly constructed
11 setback levees would be inundated through seasonal flooding. The potentially inundated areas
12 consist of moderate-value habitat for the species. Although the habitat consists of small patches and
13 narrow bands of riparian vegetation and no riparian woodrats have been detected in CZ 7, the riparian
14 patches are in proximity to each other along the San Joaquin River and there are two species
15 occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost
16 patch of riparian habitat potentially affected by levee construction. The restored floodplains would
17 transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently
18 (e.g., every 10 years or more).

19 **NEPA Effects:** Alternative 4's periodic inundation of 203 acres of riparian habitat for riparian woodrat
20 is Alternative 4 not expected to result in substantial adverse effects on riparian woodrat, either
21 directly or through habitat modifications and would not result in a substantial reduction in numbers
22 or a restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian
23 woodrat would be minimized through construction and maintenance of flood refugia to allow
24 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat
25 habitat would not adversely affect the species under Alternative 4.

26 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of
27 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian
28 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would
29 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to
30 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result
31 in significant impacts on riparian woodrat, either directly or through habitat modifications, and
32 would not result in a substantial reduction in numbers or a restriction in the range of riparian
33 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 4 would have a less-
34 than-significant impact. No mitigation would be required.

35 **Salt Marsh Harvest Mouse**

36 The habitat model used to assess effects for the salt marsh harvest mouse includes six habitat types:
37 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat
38 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within
39 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within
40 managed wetland boundaries. The tidal and managed wetland habitats were discriminated
41 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic
42 flooding and have lower long-term conservation value than tidal wetlands.

1 Construction and restoration associated with Alternative 4 conservation measures would result in
2 effects on modeled salt marsh harvest mouse habitat, which would include permanent losses and
3 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species
4 post-restoration) as indicated in Table 12-4-57. All of the effects on the species would take place
5 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
6 Alternative 4 would also include the following conservation actions over the term of the BDCP to
7 benefit salt marsh harvest mouse (~~BDCP~~ see Chapter 3, *Conservation Strategy*, of the Draft BDCP).

- 8 • Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
9 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
10 (Objective TBEWNC1.1, associated with CM4).
- 11 • Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
12 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to
13 total (existing and restored) acreage targets for each complex as specified in the final Recovery
14 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,
15 associated with CM4).
- 16 • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
17 natural community within the reserve system (Objective TBEWNC2.1).
- 18 • Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex
19 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 20 • Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide
21 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective
22 GNC1.4, associated with CM3 and CM8).
- 23 • Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or
24 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems
25 of Northern and Central California (Objective SMHM1.1).
- 26 • Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed
27 wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final
28 Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase
29 population levels above the current baseline (Objective SMHM1.2).

30 As explained below, with the restoration and protection of these amounts of habitat, in addition to
31 implementation of AMMs to minimize potential effects, impacts on the salt marsh harvest mouse
32 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
	<i>TBEW Primary</i>	64	67	0	0	0	0
	<i>TBEW Secondary</i>	0	0	0	0	0	0
	<i>Upland Secondary</i>	8	9	0	0	0	0
CM2-CM18	<i>MW Wetland Primary</i>	1,913	5,323	0	0	0	0
	<i>MW Wetland Secondary</i>	315	807	0	0	0	0
	<i>MW Upland</i>	165	762	0	0	0	0
Total Impacts CM2-CM18		2,465	6,968	0	0	0	0
TOTAL IMPACTS		2,645	6,968	0	0	0	0

^a See Appendix 12E, [Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS](#), for a 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. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

TBEW = tidal brackish emergent 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 BDCP tidal restoration (CM4) would be the only conservation measure resulting in effects on salt
7 marsh harvest mouse habitat. Habitat enhancement and management activities (CM11), which
8 include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat
9 effects. Each of these activities is described in detail below. A summary statement of the combined
10 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 11 • *CM4 Tidal Natural Communities Restoration* would result in effects on 6,968 acres of salt marsh
12 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592
13 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas
14 of converted habitat but these areas would ultimately provide suitable habitat for the species.
15 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary

1 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal
2 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap
3 with 13 CNDDDB records for salt marsh harvest mouse (California Department of Fish and
4 Wildlife 2013); however, the BDCP's conservation actions assume that all suitable habitat in
5 Suisun Marsh is occupied by the species.

- 6 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
7 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to
8 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of
9 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat
10 management actions included in *CM11 Natural Communities Enhancement and Management* that
11 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in
12 localized ground disturbances that could temporarily remove small amounts of salt marsh
13 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection
14 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of
15 restored salt marsh harvest mouse habitat would also have enhancement and management
16 actions that would include invasive species control, nonnative wildlife control, and vegetation
17 management. Ground-disturbing activities, such as removal of nonnative vegetation are
18 expected to have minor effects on habitat and are expected to result in overall improvements to
19 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These
20 effects cannot be quantified, but are expected to be minimal and would be avoided and
21 minimized by the AMMs listed below.
- 22 • *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or
23 mortality to salt marsh harvest mouse during restoration, enhancement, and management
24 activities. However, preconstruction surveys, construction monitoring, and other measures
25 would be implemented to avoid and minimize injury or mortality of this species during these
26 activities, as required by the AMM listed below.

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

30 ***Near-Term Timeframe***

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 near-term covered activities would not be adverse under NEPA. The Plan would affect
34 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-term. These
35 effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most of the habitat
36 converted would be from primary habitats (599 acres consisting of 64 acres of tidal brackish
37 emergent wetland and 534 acres of managed wetland) to secondary tidal brackish emergent
38 wetland.

39 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
40 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
41 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
42 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
43 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
44 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation

1 value than tidal wetlands. The species-specific biological goals and objectives would inform the
2 near-term protection and restoration efforts. These Plan goals represent performance standards for
3 considering the effectiveness of restoration actions. The acres of protection and restoration
4 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt
5 marsh harvest mouse.

6 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 7 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
8 wetlands, as noted in the specie's draft recovery plan, because the conversion of managed
9 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
10 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
11 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
12 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
13 prolonged period (sometimes a decade or more) in which resident mice populations are
14 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
15 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
16 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
17 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
18 habitat from a variety of factors, including flooding from levee failure and cessation of active
19 management (which is often necessary to maintain habitat values in managed wetlands).
20 Therefore, the temporary effects under Alternative 4 would be consistent with those deemed
21 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 22 • Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of
23 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural
24 communities restoration does not adversely affect the salt marsh harvest mouse population,
25 ensure that short-term population loss is relatively small and incremental, and maintain local
26 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun
27 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas
28 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan
29 (U.S. Fish and Wildlife Service 2010).
- 30 • The salt marsh harvest mouse population would be monitored during the phasing process ~~(see~~
31 ~~BDCP Chapter 3, Section 3.4.4.3.4.)~~, and adaptive management would be applied to ensure
32 maintenance of the population as described in the BDCP (~~BDCP-see~~ Chapter 3, Section 3.3.7.13,
33 *Salt Marsh Harvest Mouse, 4.4.4* and Section 3.6, *Adaptive Management and Monitoring Program,*
34 *of the Draft BDCP*).
- 35 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
36 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
37 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
38 forage and cover.

39 Because there would be no project-level effects on salt marsh harvest mouse resulting from CM1,
40 the analysis of the effects of conservation actions does not include a comparison with standard
41 ratios used for NEPA analyses.

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, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew.* 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 [Appendix 3.C, Avoidance and Minimization Measures, of](#)
4 [the Draft BDCP, and an updated version of AMM-26 is provided in Appendix D, Substantive BDCP](#)
5 [Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

6 **Late Long-Term Timeframe**

7 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.
8 Alternative 4 as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse modeled
9 habitat over the term of the Plan, which would include 5,376 acres of permanent losses and 1,592
10 acres of habitat conversions. This loss and conversion would affect 20% of the modeled habitat in
11 the study area. Most of these effects (99%) would be on managed wetlands, which, though are
12 known to be occupied by salt marsh harvest mouse, are at high risk of catastrophic flooding and
13 have a lower long-term conservation value than tidal wetlands (U.S. Fish and Wildlife Service 2010).
14 Effects on up to 20% of the species' habitat in the Plan Area may diminish the salt marsh harvest
15 mouse population in the Plan Area and result in reduced genetic diversity, thereby putting the local
16 population at risk of local extirpation due to random environmental fluctuations or catastrophic
17 events. This effect is expected to be greatest if large amounts of habitat are removed at one time in
18 Suisun Marsh and are not effectively restored for many years, and if there are no adjacent lands with
19 salt marsh harvest mouse populations to recolonize restored areas.

20 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,
21 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh
22 harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4); the protection of 6,500
23 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh
24 harvest mouse (SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or
25 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to
26 provide upland refugia for salt marsh harvest mouse (GNC1.4, associated with CM3 and CM8). Other
27 factors relevant to effects on salt marsh harvest mouse include:

- 28 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
29 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
30 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
31 often accomplished by breaching levees and converting diked nontidal marsh currently
32 occupied by salt marsh harvest mouse to tidal wetlands, their historic condition. Conversion of
33 these subsided areas requires sedimentation and accretion over time to restore marsh plains,
34 resulting in a prolonged period (sometimes a decade or more) in which resident mice
35 populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010).
36 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
37 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
38 These plans are based on the premise that managed wetlands are at high risk of loss of salt
39 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
40 cessation of active management (which is often necessary to maintain habitat values in managed
41 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
42 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 43 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does
44 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
45 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure

1 that short-term population loss is relatively small and incremental, and maintain local source
2 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
3 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
4 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
5 and Wildlife Service 2010).

- 6 • The salt marsh harvest mouse population would be monitored during the phasing process (~~see~~
7 ~~BDCP Chapter 3, Section 3.4.4.3.4,~~) and adaptive management would be applied to ensure
8 maintenance of the population as described in the BDCP (~~BDCP see~~ Chapter 3, Section 3.3.7.13,
9 Salt Marsh Harvest Mouse, and Section 3.6, Adaptive Management and Monitoring Program, of the
10 Draft BDCP 3.4.4.4 and Section 3.6).
- 11 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
12 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
13 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
14 forage and cover.
- 15 • The habitat that would be restored and protected would consist of large blocks of contiguous
16 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
17 vegetation suitable for the species. This would provide greater habitat connectivity and greater
18 habitat value, which is expected to accommodate larger populations and to therefore increase
19 population resilience to random environmental events and climate change.

20 The BDCP's beneficial effects analysis (~~BDCP~~ Chapter 5, Section 5.6, Effects on Covered Wildlife and
21 Plant Species, of the Draft BDCP) estimates that the restoration and protection actions discussed
22 above could result in the restoration of 6,046 acres and the protection of 1,550 acres of modeled
23 habitat for salt marsh harvest mouse.

24 **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse
25 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and
26 potential direct mortality of a special-status species. However, the BDCP has committed to habitat
27 protection, restoration, management, and enhancement associated with CM3, CM4, CM8, and CM11.
28 This habitat protection, restoration, management, and enhancement would be guided by species-
29 specific goals and objectives and by AMM1–AMM5 and AMM26, which would be in place during
30 construction activity. Considering these commitments, losses and conversions of salt marsh harvest
31 mouse habitat and potential mortality of individuals in the near-term and late long-term under
32 Alternative 4 would not be an adverse effect.

33 **CEQA Conclusion:**

34 **Near-Term Timeframe**

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 effects of near-term covered activities would be less than significant under CEQA. The Plan
38 would affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-
39 term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most
40 of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal
41 brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish
42 emergent wetland.

1 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
2 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
3 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
4 mouse). Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
5 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
6 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
7 value than tidal wetlands. The species-specific biological goals and objectives would inform the
8 near-term protection and restoration efforts. These Plan goals represent performance standards for
9 considering the effectiveness of restoration actions. The acres of protection and restoration
10 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt
11 marsh harvest mouse habitat.

12 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 13 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
14 wetlands as noted in the specie's draft recovery plan because the conversion of managed
15 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
16 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
17 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
18 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
19 prolonged period (sometimes a decade or more) in which resident mice populations are
20 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
21 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
22 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
23 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
24 habitat from a variety of factors, including flooding from levee failure and cessation of active
25 management (which is often necessary to maintain habitat values in managed wetlands).
26 Therefore, the temporary impacts under Alternative 4 would be consistent with those deemed
27 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 28 • To ensure that temporal loss as a result of tidal natural communities restoration does not
29 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be
30 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-
31 term population loss is relatively small and incremental, and maintain local source populations
32 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be
33 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh
34 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife
35 Service 2010).
- 36 • The salt marsh harvest mouse population would be monitored during the phasing process (~~see~~
37 ~~BDCP Chapter 3, Section 3.4.4.3.4,~~) and adaptive management would be applied to ensure
38 maintenance of the population as described in the BDCP (~~BDCP see~~ Chapter 3, Section 3.3.7.13,
39 Salt Marsh Harvest Mouse, and Section 3.6, Adaptive Management and Monitoring Program, of the
40 Draft BDCP 3.4.4.4 and 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.

1 Because there would be no project-level impacts on salt marsh harvest mouse resulting from CM1,
2 the analysis of the impacts of conservation actions does not include a comparison with standard
3 ratios used for project-level CEQA analyses.

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*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
8 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
9 areas. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of](#)
10 [the Draft BDCP, and an updated version of AMM-26 is provided in Appendix D, Substantive BDCP](#)
11 [Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

12 These commitments are more than sufficient to support the conclusion that the near-term effects of
13 Alternative 4 would be less than significant under CEQA.

14 **Late Long-Term Timeframe**

15 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.
16 Alternative 4 as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse modeled
17 habitat over the term of the Plan, which would include 5,376 acres of permanent losses and 1,592
18 acres of habitat conversions. The Plan includes a commitment to restore or create 6,000 acres of
19 tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh habitat
20 (primary habitat for salt marsh harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1,
21 associated with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of which
22 would be specifically managed for salt marsh harvest mouse (Objectives SMHM1.2 and MWNC1.1,
23 associated with CM3), and the protection and/or restoration of grassland adjacent to tidal
24 restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh
25 harvest mouse (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects
26 on salt marsh harvest mouse include:

- 27 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
28 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
29 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
30 often accomplished by breaching levees and converting diked nontidal marsh currently
31 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.
32 Conversion of these subsided areas requires sedimentation and accretion over time to restore
33 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident
34 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service
35 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
36 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
37 These plans are based on the premise that managed wetlands are at high risk of loss of salt
38 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
39 cessation of active management (which is often necessary to maintain habitat values in managed
40 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
41 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 42 • In order to ensure that temporal loss as a result of tidal natural communities restoration does
43 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
44 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure

1 that short-term population loss is relatively small and incremental, and maintain local source
2 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
3 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
4 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
5 and Wildlife Service 2010).

- 6 • The salt marsh harvest mouse population would be monitored during the phasing process (~~see~~
7 ~~BDCP Chapter 3, Section 3.4.4.3.4,~~) and adaptive management would be applied to ensure
8 maintenance of the population as described in the BDCP (~~BDCP see~~ Chapter 3, Section 3.3.7.13,
9 Salt Marsh Harvest Mouse, and Section 3.6, Adaptive Management and Monitoring Program, of the
10 Draft BDCP 3.4.4.4 and Section 3.6).
- 11 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
12 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
13 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
14 forage and cover.
- 15 • The habitat that would be restored and protected would consist of large blocks of contiguous
16 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
17 vegetation suitable for the species. This would provide greater habitat connectivity and greater
18 habitat value, which is expected to accommodate larger populations and to therefore increase
19 population resilience to random environmental events and climate change.

20 The BDCP's beneficial effects analysis (~~BDCP~~ Chapter 5, Section 5.6, Effects on Covered Wildlife and
21 Plant Species, of the Draft EIR/EIS) estimates that the restoration and protection actions discussed
22 above could result in the restoration of 6,046 acres and the protection of 1,550 acres of modeled
23 habitat for salt marsh harvest mouse.

24 Alternative 4 would result in substantial modifications to salt marsh harvest mouse habitat in the
25 absence of other conservation actions. However, with habitat protection, restoration, management,
26 and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and
27 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction
28 period, Alternative 4 over the term of the BDCP would not result in a substantial adverse effect
29 through habitat modifications and would not substantially reduce the number or restrict the range
30 of the species. Therefore, the alternative would have a less-than-significant impact on salt marsh
31 harvest mouse.

32 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

33 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
34 and management and enhancement activities (CM11) could result in temporary noise and visual
35 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of
36 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM5, and
37 AMM26, which would be in effect throughout the term of the Plan.

38 The use of mechanical equipment during the implementation of the conservation measures could
39 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest
40 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on
41 the species and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would
42 ensure measures are in place to prevent runoff from the construction area and potential effects of
43 sediment on salt marsh harvest mouse.

1 Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to
 2 mercury. Mercury is transformed into the more bioavailable form of methylmercury under
 3 anaerobic conditions, which in the environment typically occurs in sediments subjected to regular
 4 wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that
 5 create newly inundated areas could increase bioavailability of mercury. In general, the highest
 6 methylation rates are associated with high tidal marshes that experience intermittent wetting and
 7 drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be
 8 primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl
 9 mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury
 10 by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et
 11 al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown
 12 that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al.
 13 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to
 14 methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay
 15 showed an absence of salt marsh harvest mouse where mercury concentrations measured in house
 16 mice (*Mus musculus*) livers were $\geq 0.19 \mu\text{g/g}$ (dry weight) (Clark et al. 1992). Clark et al (1992) also
 17 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected
 18 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh
 19 harvest mouse at certain locations may be associated with higher amounts of mercury and
 20 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt
 21 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants
 22 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown
 23 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh
 24 harvest mouse.

25 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
 26 under the plan would generate less methylmercury than the existing managed wetlands. [As
 27 discussed in Appendix D Substantive BDCP Revisions, in this RDEIR/SEIS, managed wetlands provide
 28 for the highest rates of methylation \(Windham-Myers et al. 2010\). Thus, restoration actions in
 29 Suisun Marsh that convert managed to unmanaged tidal wetlands are expected to decrease mercury
 30 methylation on a local scale, and total bioavailable methylmercury on a broader scale in the Suisun
 31 Marsh system. Overall, BDCP restoration actions should result in a net benefit to Suisun Marsh in
 32 terms of mercury.](#) The potential for salt marsh harvest mouse exposure to methyl mercury in Suisun
 33 Marsh may decrease in the long term because the creation of tidal brackish emergent wetland would
 34 predominantly result from the conversion of managed wetlands. [CM12 Methylmercury Management
 35 \(as revised in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS\)](#) includes provisions for
 36 project-specific Mercury Management Plans. Along with avoidance and minimization measures and
 37 adaptive management and monitoring, CM12 could reduce the effects of methylmercury on salt
 38 marsh harvest mouse resulting from BDCP tidal restoration.

39 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 4
 40 would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also
 41 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,
 42 or restrict the species' range. Therefore, the indirect effects of Alternative 4 would not have an
 43 adverse effect on salt marsh harvest mouse.

44 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
 45 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical
 46 equipment during construction could cause the accidental release of petroleum or other

1 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge
2 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With
3 implementation of AMM1–AMM5 and AMM26 as part of Alternative 4 construction, operation and
4 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh
5 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result
6 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The
7 indirect effects of BDCP Alternative 4 would have a less-than-significant impact on salt marsh
8 harvest mouse.

9 Salt marsh harvest mouse could experience indirect effects from increased exposure to
10 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the
11 potential indirect effects of methylmercury would not result in a substantial reduction in numbers
12 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-
13 significant impact on the species.

14 **Suisun Shrew**

15 This section describes the effects of Alternative 4, including water conveyance facilities construction
16 and implementation of other conservation components, on the Suisun shrew. Primary Suisun shrew
17 habitat consists of all *Salicornia*-dominated natural seasonal wetlands and certain *Scirpus* and *Typha*
18 communities found within Suisun Marsh only. Low marsh dominated by *Schoenoplectus acutus* and
19 *S. californicus* and upland transitional zones within 150 feet of the tidal wetland edge were classified
20 separately as secondary habitat because they are used seasonally (Hays and Lidicker 2000). All
21 managed wetlands were excluded from the habitat model.

22 Construction and restoration associated with Alternative 4 conservation measures would result in
23 effects on modeled Suisun shrew habitat, which would include permanent losses and habitat
24 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species post-
25 restoration) as indicated in Table 12-4-58. All of the effects on the species would take place over an
26 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
27 Alternative 4 would also include the following conservation actions over the term of the BDCP to
28 benefit Suisun shrew ([BDCP-see Chapter 3, Conservation Strategy, of the Draft BDCP](#)).

- 29 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
30 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
31 (TBEWNC1.1, associated with CM4)
- 32 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
33 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing
34 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal
35 Marsh Ecosystems of Northern and Central California (TBEWNC1.2, 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 (TBEWNC2.1).
- 38 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at
39 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which
40 provides refugia during high tides (GNC1.4, associated with CM3 and CM8).

41 As explained below, with the restoration and protection of these amounts of habitat, impacts on the
42 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA
43 purposes under Alternative 4.

1 **Table 12-4-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
Total Impacts CM2–CM18		105	401	0	0	0	0
TOTAL IMPACTS		105	401	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun Shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to
 5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground
 6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of
 7 these activities is described in detail below. A summary statement of the combined impacts and
 8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 9 • *CM4 Tidal Natural Communities Restoration* would result in effects on 401 acres of Suisun shrew
 10 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat
 11 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but
 12 would ultimately provide suitable habitat for the species. However, all 24 acres would be
 13 converted from secondary to primary habitat and therefore over would be a net benefit to the
 14 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun
 15 shrew (California Department of Fish and Wildlife 2013).
- 16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
 17 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to
 18 provide habitat for covered species, including Suisun shrew. A variety of habitat management
 19 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
 20 to enhance and manage these areas may result in localized ground disturbances that could
 21 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would
 22 be protected and/or restored within 200 feet of restored tidal marsh would also have

1 enhancement and management actions that would include invasive species control, nonnative
2 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of
3 nonnative vegetation are expected to have minor effects on habitat and are expected to result in
4 overall improvements to and maintenance of Suisun shrew habitat values over the term of the
5 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
6 and minimized by the AMMs listed below.

- 7 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or
8 mortality to Suisun shrew during restoration, enhancement, and management activities.
9 However, preconstruction surveys, construction monitoring, and other measures would be
10 implemented to avoid and minimize injury or mortality of this species during these activities, as
11 required by the AMM listed below.

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

15 ***Near-Term Timeframe***

16 The near-term BDCP conservation strategy has been evaluated to determine whether it would
17 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
18 the effects of near-term covered activities would not be adverse under NEPA. The Plan would affect
19 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects include
20 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat being
21 converted to primary habitat.

22 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
23 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
24 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals
25 represent performance standards for considering the effectiveness of restoration actions. The acres
26 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
27 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

28 Other factors relevant to effects on Suisun shrew are listed here.

- 29 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
30 loss of habitat and habitat fragmentation.
- 31 • The habitat that would be restored and protected would consist of large blocks of contiguous
32 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
33 vegetation suitable for the species. This would provide greater habitat connectivity and greater
34 habitat value and quantity, with is expected to accommodate larger populations and to therefore
35 increase population resilience to random environmental events and climate change.
- 36 • The amount of tidal habitat restored in the near-term (2,000 acres) would greatly exceed the
37 amount permanently lost (105 acres).

38 Because there would be no project-level effects on Suisun shrew resulting from CM1, the analysis of
39 the effects of conservation actions does not include a comparison with standard ratios used for
40 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 [Appendix 3.C, Avoidance and Minimization Measures, of](#)
7 [the Draft BDCP, and an updated version of AMM-26 is provided in Appendix D, Substantive BDCP](#)
8 [Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

9 **Late Long-Term Timeframe**

10 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 4
11 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the
12 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions
13 (roughly 5% of the habitat in the study area).

14 The Plan contains a commitment to restore or create 6,000 acres of tidal brackish emergent
15 wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for
16 Suisun shrew) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the
17 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of
18 tidal restoration, of which approximately 150 feet would likely benefit the species) to provide
19 upland refugia for Suisun shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors
20 relevant to effects on Suisun shrew include:

- 21 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
22 loss of habitat and habitat fragmentation.
- 23 ● The habitat that would be restored and protected would consist of large blocks of contiguous
24 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
25 vegetation suitable for the species. This would provide greater habitat connectivity and greater
26 habitat value and quantity, with is expected to accommodate larger populations and to therefore
27 increase population resilience to random environmental events and climate change.
- 28 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
29 and converted (401 acres).

30 The BDCP's beneficial effects analysis ([BDCP](#) Chapter 5, Section 5.6, [Effects on Covered Wildlife and](#)
31 [Plant Species, of the Draft BDCP](#)) estimates that the restoration and protection actions discussed
32 above could result in the restoration of 6,006 acres and the protection of 232 acres of modeled
33 habitat for Suisun shrew.

34 **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from
35 Alternative 4 would represent an adverse effect as a result of habitat modification and potential
36 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,
37 restoration, management, and enhancement with CM3, CM4, CM8, and CM11. This habitat
38 protection, restoration, management, and enhancement would be guided by species-specific goals
39 and objectives and by AMM1-AMM5 and AMM26, which would be in place throughout the
40 construction period. Considering these commitments, losses and conversions of Suisun shrew
41 habitat and potential mortality of individuals under Alternative 4 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 effects of near-term covered activities would be less than significant under CEQA. The Plan
6 would affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These
7 effects include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary
8 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 would likely 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 impacts on Suisun shrew are listed below.

- 16
- 17 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
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) would greatly exceed the
24 amount permanently lost (105 acres).

25 Because there would be no project-level impacts on Suisun shrew resulting from CM1, the analysis
26 of the impacts 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 implement AMM1–AMM5 and AMM26. All of these AMMs
29 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
30 areas. The AMMs are described in detail in [Appendix 3.C, Avoidance and Minimization Measures, of
31 the Draft BDCP, and an updated version of AMM-26 is provided in Appendix D, Substantive BDCP
32 Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

33 These commitments are more than sufficient to support the conclusion that the near-term effects of
34 Alternative 4 would be less than significant under CEQA. [No mitigation would be required.](#)

35 **Late Long-Term Timeframe**

36 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 4
37 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the
38 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions
39 (roughly 5% of the habitat in the study area). The Plan contains a commitment to restore or create
40 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high
41 marsh habitat (primary habitat for Suisun shrew) (Objective TBEWNC1.1, TBEWNC1.2, SMHM1.1,

1 associated with CM4) and the protection and/or restoration of grassland adjacent to tidal
2 restoration (areas within 200 feet of tidal restoration, of which approximately 150 feet would likely
3 benefit the species) to provide upland refugia for Suisun shrew (Objective GNC1.4, associated with
4 CM3 and CM8). Other factors relevant to effects on Suisun shrew include:

- 5 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
6 loss of habitat and habitat fragmentation.
- 7 • The habitat that would be restored and protected would consist of large blocks of contiguous
8 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
9 vegetation suitable for the species. This would provide greater habitat connectivity and greater
10 habitat value and quantity, with is expected to accommodate larger populations and to therefore
11 increase population resilience to random environmental events and climate change.
- 12 • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
13 and converted (401 acres).

14 The BDCP's beneficial effects analysis (~~BDCP~~-Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
15 *Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
16 above could result in the restoration of 6,006 acres and the protection of 232 acres of modeled
17 habitat for Suisun shrew.

18 Alternative 4 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 period, Alternative 4 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 No mitigation would be required.

26 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

27 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
28 and management and enhancement activities (CM11) could result in temporary noise and visual
29 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.
30 These potential effects would be minimized or avoided through AMM1–AMM5, and AMM26, which
31 would be in effect throughout the term of the Plan.

32 The use of mechanical equipment during the implementation of the conservation measures could
33 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and
34 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species
35 and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would ensure
36 measures are in place to prevent runoff from the construction area and potential effects of sediment
37 on Suisun shrew.

38 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury
39 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,
40 which in the environment typically occurs in sediments subjected to regular wetting and drying
41 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly
42 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates

1 are associated with high tidal marshes that experience intermittent wetting and drying and
2 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be
3 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal
4 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh
5 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations
6 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and
7 forage on earthworms and other prey that live within contaminated sediments (Talmage and
8 Walton 1993; Hinton and Veiga 2002).

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 Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long
12 term because the creation of tidal brackish emergent wetland would predominantly result from the
13 conversion of managed wetlands. *CM12 Methylmercury Management* ([as revised in Appendix D,](#)
14 [Substantive BDCP Revisions, in this RDEIR/SDEIS](#)) includes provisions for project-specific Mercury
15 Management Plans. Along with avoidance and minimization measures and adaptive management
16 and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew resulting from
17 BDCP tidal restoration.

18 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 4
19 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either
20 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
21 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the
22 indirect effects of Alternative 4 would not have an adverse effect on Suisun shrew.

23 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
24 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during
25 construction could cause the accidental release of petroleum or other contaminants that could
26 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun
27 shrew habitat could also impact the species. With implementation of AMM1-AMM5, and AMM26 as
28 part of Alternative 4 construction, operation and maintenance, the BDCP would avoid the potential
29 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in
30 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of
31 Suisun shrew. The indirect effects of BDCP Alternative 4 would have a less-than-significant impact
32 on Suisun shrew.

33 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a
34 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
35 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
36 range of Suisun shrew, and, therefore, would have a less-than significant impact on the species. [No](#)
37 [mitigation would be required.](#)

38 **San Joaquin Kit Fox and American Badger**

39 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the
40 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along
41 the study area's southwestern edge, in CZ 7-CZ 10. The study area represents the extreme
42 northeastern corner of the [San Joaquin kit fox's species'](#) range in California, which extends westward
43 and southward from the study area border. The northern range of the San Joaquin kit fox (including
44 the study area) was most likely marginal habitat historically and has been further degraded due to

1 development pressures, habitat loss, and fragmentation (Clark et al. 2007). CNDDDB ((California
2 Department of Fish and Wildlife 2013) reports twelve occurrences of San Joaquin kit foxes along the
3 extreme western edge of the Plan Area within CZ 8, south of Brentwood (Figure 12-49). However,
4 Clark et al. (2007) provide evidence that a number of CNDDDB occurrences in the northern portion of
5 the species' range may be coyote pups misidentified as San Joaquin kit foxes. Smith et al. (2006)
6 suggest that the northern range may possibly be a population sink for the San Joaquin kit fox. There
7 are five American badger records in the study area (California Department of Fish and Wildlife
8 2013). Two are from 1938 and no longer extant. The remaining three are all located in CZ 8, west of
9 Clifton Court Forebay.

10 Construction and restoration associated with Alternative 4 conservation measures would result in
11 both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-4-
12 59). Grassland restoration, and protection and management of natural communities could affect
13 modeled San Joaquin San Joaquin kit fox habitat and potential American badger habitat. Full
14 implementation of Alternative 4 would also include biological objectives over the term of the BDCP
15 to benefit the San Joaquin kit fox which would also benefit American badger which uses similar
16 habitat (BDCP see Chapter 3, Conservation Strategy, of the Draft BDCP). The conservation strategy
17 for the San Joaquin kit fox involves protecting and enhancing habitat in the northern extent of the
18 species' range to increase the likelihood that San Joaquin kit fox may reside and breed in the Plan
19 Area; and providing connectivity to habitat outside the Plan Area. The conservation measures that
20 would be implemented to achieve the biological goals and objectives are summarized below.

- 21 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
22 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
23 associated with CM3–CM8, and CM11).
- 24 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
25 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 26 • Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali
27 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 28 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core
29 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of
30 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
31 associated with CM3).
- 32 • Restore vernal pool complex CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
33 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with
34 CM3 and CM9).
- 35 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 36 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
37 (Objective GNC1.2, associated with CM3 and CM8).
- 38 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
39 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
40 ASWNC2.3, associated with CM11).
- 41 • Increase prey, especially small mammals and insects, for grassland-foraging species in
42 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal
43 wetland complex (Objective ASWNC2.4, associated with CM11).

- 1 • Increase burrow availability for burrow-dependent species in grasslands surrounding vernal
2 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with
3 CM11).
- 4 • Increase prey, especially small mammals and insects, for grassland-foraging species in
5 grasslands surrounding vernal pools within restored and protected vernal pool complex
6 (Objective VPNC2.5, associated with CM11).
- 7 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
8 CM11).
- 9 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-
10 foraging species (Objective GNC2.4, associated with CM11).

11 As explained below, with the restoration and protection of these amounts of habitat, in addition to
12 the AMMs to reduce potential effects, impacts on San Joaquin kit fox and American badger would not
13 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

14 **Table 12-4-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 4**
15 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Grassland	207267	267207	10356	56103	NA	NA
Total Impacts CM1		267207 7	267207 7	56103 56103	56103 56103	NA	NA
CM2–CM18	Grassland	3	8	0	0	0	0
Total Impacts CM2–CM18		3	8	0	0	0	0
TOTAL IMPACTS		21027 0	21527 5	56103 56103	56103 56103	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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

16

17 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**
18 **and American Badger**

19 Alternative 4 conservation measures would result in the permanent and temporary loss combined
20 of ~~318~~331 acres of modeled habitat for the San Joaquin kit fox (Table 12-4-59). Because American
21 badger uses grasslands for denning and foraging and may occupy the same range as the San Joaquin
22 kit fox in the project area, shares the same geographic locations as the San Joaquin kit fox, effects are

1 anticipated to be the same as those described for San Joaquin kit fox. There are 3 San Joaquin kit fox
2 and no American badger occurrences that overlap with the Plan footprint. Construction of
3 Alternative 4 water conveyance facilities (CM1) and recreation facilities (CM11) would remove
4 habitat. Habitat enhancement and management activities (CM11) could result in local adverse
5 effects on species. In addition, construction vehicle activity could cause injury or mortality of San
6 Joaquin kit foxes and badgers. Each of these individual activities is described below. A summary
7 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
8 conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation:* Construction of the conveyance facilities would result in the
10 permanent loss of approximately 207-267 acres and the temporary loss of 103-56 acres of
11 modeled San Joaquin kit fox and American badger habitat. This habitat is located in areas of
12 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to
13 Clifton Court Forebay, in CZ 8. There are 3 San Joaquin kit fox and no American badger
14 occurrences that overlap with the CM1 footprint.
- 15 • *CM11 Natural Communities Enhancement and Management:* The creation of recreational trails
16 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin
17 kit fox modeled habitat and American badger potential habitat. AMM24 San Joaquin Kit Fox,
18 would be implemented to ensure that San Joaquin kit fox dens are avoided, as described in
19 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP-BDCPBDCP Appendix 3.C,
20 Avoidance and Minimization Measures. Mitigation Measure BIO-162: Conduct Preconstruction
21 Survey for American Badger would be implemented to ensure that American badger dens are
22 avoided.

23 Passive recreation in the reserve system could result in disturbance of San Joaquin kit foxes and
24 American badgers at their den site. Natal and pupping dens would be particularly vulnerable to
25 human disturbance. Additionally, disease could be transmitted from domestic dogs that enter
26 the reserve system with recreational users. However, AMM37 Recreation and Mitigation
27 Measure BIO-162 would prohibit construction of new trails within 250 feet of active San Joaquin
28 kit fox and American badger dens. Existing trails would be closed within 250 feet of active
29 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
30 would be allowed on reserve units with active San Joaquin kit fox and American badger
31 populations. Rodent control would be prohibited even on grazed or equestrian access areas with
32 San Joaquin kit fox or American badger populations. AMM37 measures to protect San Joaquin kit
33 fox would also benefit American badger if present. With these restrictions, recreation-related
34 effects on San Joaquin kit fox and American badger are expected to be minimal.

35 The BDCP would require the enhancement and management of these protected existing
36 grasslands and restored grasslands to improve their function as a natural community of plants
37 and wildlife and for associated covered species, including San Joaquin kit fox and American
38 badger. The BDCP also includes actions to improve rodent prey availability.

39 However, management activities could result in injury or mortality of San Joaquin kit fox or
40 American badger if individuals were present in work sites or if dens were located in the vicinity
41 of habitat management work sites. A variety of habitat management actions included in *CM11*
42 that are designed to enhance wildlife values on protected lands may result in localized ground
43 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American
44 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal
45 of nonnative vegetation and road and other infrastructure maintenance activities, are expected

1 to have minor effects on available habitat and are expected to result in overall improvements to
2 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.
3 These effects cannot be quantified, but are expected to be minimal and would be avoided and
4 minimized through the AMMs [and Mitigation Measure](#) listed below. These AMMs [and Mitigation](#)
5 [Measure](#) would remain in effect throughout the BDCP's construction phase.

- 6 • Operations and maintenance: Ongoing maintenance of BDCP facilities would be expected to have
7 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction
8 operations and maintenance of the above-ground water conveyance facilities and restoration
9 infrastructure could result in ongoing but periodic disturbances that could affect either species'
10 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would
11 include vegetation management, levee and structure repair, and regrading of roads and
12 permanent work areas. These effects, however, would be minimized with implementation of
13 AMM1-AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,
14 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*
15 *Badger*.
- 16 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
17 either species. If San Joaquin kit fox or American badger reside where activities take place (most
18 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land
19 clearing, construction, operations and maintenance, and restoration, enhancement, and
20 management activities could result in injury to or mortality of either species. Measures would be
21 implemented to avoid and minimize injury to or mortality of these species as described in
22 AMM1-AMM6, AMM10, AMM24, and AMM37 (see [Appendix 3.C, Avoidance and Minimization](#)
23 [Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in Appendix D,](#)
24 [Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C](#)) and Mitigation Measure
25 BIO-162.

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 water conveyance facilities construction is being evaluated at the project level, the near-
31 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
32 protection or restoration in an appropriate timeframe to ensure that the construction effects would
33 not be adverse under NEPA.

34 Under Alternative 4 there would be a loss of [313-326](#) acres of San Joaquin kit fox modeled habitat
35 and American badger habitat from CM1 ([310-323](#) acres) and CM11 (3 acres).

36 Typical NEPA project-level mitigation ratio for the natural community that would be affected and
37 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3,
38 [Conservation Strategy](#), of the [Draft BDCP](#) would be 2:1 for protection of grassland. Using this ratio
39 would indicate that [626-652](#) acres of grassland should be protected for San Joaquin kit fox to
40 mitigate near-term losses.

41 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
42 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
43 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal

1 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
2 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities
3 are expected to be concluded during the first 10 years of Plan implementation, which is close
4 enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes.
5 These commitments are more than sufficient to support the conclusion that the near-term effects of
6 Alternative 4 would be not be adverse under NEPA, because the number of acres required to meet
7 the typical ratios described above would be only ~~626-652~~ acres of grassland protected.

8 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
9 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and
10 potential direct mortality of special-status species. However, the effects of Alternative 4 would not
11 be adverse with habitat protection, restoration, management, and enhancement in addition to
12 implementation of *AMM1 Worker Awareness Training, AMM2 Construction Best Management*
13 *Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment*
14 *Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and*
15 *Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, AMM10 Restoration of Temporarily*
16 *Affected Natural Communities, AMM24 San Joaquin Kit Fox, and AMM37 Recreation.* AMMs contain
17 elements that avoid or minimize the risk of construction activity affecting habitat and species
18 adjacent to work areas. [Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and](#)
19 [an updated version of AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this](#)
20 [RDEIR/SDEISBDCP Appendix 3.C](#) describes the AMMs in detail. Remaining effects would be
21 addressed by implementation of Mitigation Measure BIO-162.

22 **Late Long-Term Timeframe**

23 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 4 as a
24 whole would result in the permanent loss of and temporary effects on ~~318-331~~ acres of modeled
25 habitat for San Joaquin kit fox and potential habitat for American badger, representing 6% of the
26 modeled habitat.

27 With full implementation of Alternative 4, at least 1,000 acres of grassland would be protected in CZ
28 8, where the San Joaquin kit fox [and American badger](#) is most likely to occur if present in the study
29 area. Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in CZ 8.
30 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
31 the amount of modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in
32 the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored
33 grasslands would be suitable for ~~the both~~ species.

34 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square
35 miles; see [BDCP Appendix 2.A, Covered Species Accounts, of the Draft BDCP](#)), habitat connectivity is
36 key to the conservation of the species. Grasslands would be acquired for protection in locations that
37 provide connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other
38 adjoining San Joaquin kit fox habitat within and adjacent to the Plan Area. Connectivity to occupied
39 habitat adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes [and](#)
40 [American badger](#), if present, to larger habitat patches outside of the Plan Area in Contra Costa
41 County. Grassland protection would focus in particular on acquiring the largest remaining
42 contiguous patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 ([BDCP](#)
43 [see Appendix 2.A, Covered Species Accounts, of the Draft BDCP](#)). This area connects to more than 620
44 acres of existing habitat that was protected under the East Contra Costa County HCP/NCCP.

1 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
2 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
3 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
4 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
5 GNC2.3, Objective GNC2.4). These management and enhancement actions are expected to benefit the
6 San Joaquin kit fox as well as the American badger by increasing the habitat value of the protected
7 and restoration grasslands.

8 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
9 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
10 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
11 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
12 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
13 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
14 construction.

15 The BDCP's beneficial effects analysis (BDCP-Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
16 *Plant Species, of the Draft BDCP*) estimates that the restoration and protection actions discussed
17 above, as well as the restoration of grassland and vernal pool that could overlap with the species
18 model, would result in the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In
19 addition, protection of grassland and vernal pool complex could overlap with the species model and
20 would result in the protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These
21 restoration and protection actions would also benefit the American badger.

22 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and
23 American badger habitat from Alternative 4 would represent an adverse effect as a result of habitat
24 modification and potential direct mortality of special-status species. However, with habitat
25 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11 and
26 guided by AMM1–AMM6, AMM10, AMM245, and AMM37, which would be in place throughout the
27 construction period during all project activities, and with implementation of Mitigation Measure BIO-
28 162, the effects of Alternative 4 as a whole on San Joaquin kit fox and American badger would not be
29 adverse.

30 **CEQA Conclusion:**

31 ***Near-Term Timeframe***

32 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the
33 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient
34 habitat protection or restoration in an appropriate timeframe to ensure that the construction effects
35 would be less than significant for CEQA purposes.

36 Under Alternative 4 there would be a loss of 313-326 acres of San Joaquin kit fox modeled habitat
37 and American badger habitat from CM1 (310-323 acres) and CM11 (3 acres). Typical CEQA project-
38 level mitigation ratio for the natural community that would be affected and that is identified in the
39 biological goals and objectives for San Joaquin kit fox in Chapter 3, Conservation Strategy, of the
40 Draft BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 626-652
41 acres of grassland should be protected for San Joaquin kit fox and American badger to mitigate near-
42 term losses.

1 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
2 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
3 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
4 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
5 acres of grassland (Objective GNC1.1).

6 These conservation actions would occur in the same timeframe as the construction losses, thereby
7 avoiding ~~adverse effects~~significant impacts of habitat loss on San Joaquin kit fox and American
8 badger. These Plan objectives represent performance standards for considering the effectiveness of
9 CM3 protection and restoration actions. The acres of restoration and protection contained in the
10 near-term Plan goals and the additional detail in the biological objectives for San Joaquin kit fox and
11 the mitigation measure for American badger satisfy the typical mitigation that would be applied to
12 the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation
13 measures.

14 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
15 habitat from Alternative 4 Alternative 4A would represent a significant impact as a result of habitat
16 modification and potential direct mortality of a special-status species. However, with habitat
17 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11, and
18 guided by AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the
19 time period of construction during all project activities, and with implementation of Mitigation
20 Measure BIO-162, the impact of Alternative 4 Alternative 4A as a whole on San Joaquin kit fox and
21 American badger would be less than significant.

22 ~~The BDCP also contains commitments to implement AMM1–AMM6, AMM10, and AMM24, which~~
23 ~~include elements that avoid or minimize the risk of construction activity impacting habitat and~~
24 ~~species adjacent to work areas. Remaining effects would be addressed by implementation of~~
25 ~~Mitigation Measure BIO-162. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and*~~
26 ~~*Minimization Measures.*~~

27 ~~These commitments are more than sufficient to support the conclusion that the near-term effects of~~
28 ~~Alternative 4 Alternative 4A on San Joaquin kit fox and American badger would be less than~~
29 ~~significant under CEQA, because the number of acres required to meet the typical ratios described~~
30 ~~above would be only 626 652 acres of grassland protected.~~

31 **Late Long-Term Timeframe**

32 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 4 as a
33 whole would result in the permanent loss of and temporary effects on ~~318~~331 acres of modeled
34 habitat for San Joaquin kit fox and potential habitat for American badger.

35 With full implementation of Alternative 4, at least 1,000 acres of grassland would be protected in CZ
36 8, where the San Joaquin kit fox and American badger is most likely to occur if present in the study
37 area. Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in CZ 8.
38 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
39 the amount of modeled habitat in this natural community in the Plan Area an estimated 132 acres of
40 restored grasslands would be suitable for the species.

41 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square
42 miles; see BDCP Appendix 2.A, *Covered Species Accounts, of the Draft BDCP*), habitat connectivity is
43 key to the conservation of the species. Grasslands would be acquired for protection in locations that

1 provide connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other
2 adjoining San Joaquin kit fox habitat and American badger within and adjacent to the Plan Area.
3 Connectivity to occupied habitat adjacent to the Plan Area would help ensure the movement of San
4 Joaquin kit foxes and American badger, if present, to larger habitat patches outside of the Plan Area
5 in Contra Costa County. Grassland protection would focus in particular on acquiring the largest
6 remaining contiguous patches of unprotected grassland habitat, which are located south of SR 4 in
7 CZ 8 (~~BDCP~~ see Appendix 2.A of the Draft BDCP). This area connects to more than 620 acres of
8 existing habitat that was protected under the East Contra Costa County HCP/NCCP.

9 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
10 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
11 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
12 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
13 GNC2.3, Objective GNC2.4). These management and enhancement actions are expected to benefit the
14 San Joaquin kit fox as well as the American badger by increasing the habitat value of the protected
15 and restoration grasslands.

16 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
17 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
18 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
19 (including grasslands and

20 The BDCP's beneficial effects analysis (~~BDCP~~ Chapter 5, Section 5.6, Effects on Covered Wildlife and
21 Plant Species, of the Draft BDCP) estimates that the restoration and protection actions discussed
22 above, as well as the restoration of grassland and vernal pool that could overlap with the species
23 model, would result in the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In
24 addition, protection of grassland and vernal pool complex could overlap with the species model and
25 would result in the protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These
26 restoration and protection actions would also benefit the American badger.

27 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
28 habitat from Alternative 4 would represent a significant impact as a result of habitat modification
29 and potential direct mortality of a special-status species. However, with habitat protection,
30 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by
31 AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the time period
32 of construction during all project activities, and with implementation of Mitigation Measure BIO-162,
33 the impact of Alternative 4 as a whole on San Joaquin kit fox and American badger would be less
34 than significant.

35 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

36 A qualified biologist provided by DWR will survey for American badger concurrent with the
37 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the
38 biologist will passively relocate badgers out of the work area prior to construction if feasible. If
39 an active den is detected within the work area, DWR will establish a suitable buffer distance and
40 avoid the den until the qualified biologist determines the den is no longer active. Dens that are
41 determined to be inactive by the qualified biologist will be collapsed by hand to prevent
42 occupation of the den between the time of the survey and construction activities. In addition, the
43 construction of new trails within 50 feet of active American badger dens would be prohibited.
44 Existing trails would be closed within 250 feet of active natal/pupping dens until young have

1 vacated, and within 50 feet of other active dens. No dogs would be allowed on reserve units with
2 active American badger populations. Rodent control would be prohibited on areas with
3 American badger populations to ensure rodent prey availability.

4 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 5 **American Badger**

6 Noise and visual disturbances outside the project footprint but within 250 feet of construction
7 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American
8 badger. Water conveyance facilities operations and maintenance activities would include vegetation
9 and weed control, ~~ground-squirrel~~rodent control, canal maintenance, infrastructure and road
10 maintenance, levee maintenance, and maintenance and upgrade of electrical systems. Because
11 operations and maintenance are covered activities rodent control would be prohibited in areas with
12 San Joaquin kit fox or American badger populations to ensure rodent prey availability. While
13 maintenance activities are not expected to remove San Joaquin kit fox and badger habitat, operation
14 of equipment could disturb small areas of vegetation around maintained structures and could result
15 in injury or mortality of individual foxes and badgers, if present. Given the remote likelihood of
16 active San Joaquin kit fox or badger dens in the vicinity of the conveyance facility, the potential for
17 this effect is small and would further be minimized with the implementation of seasonal no-
18 disturbance buffers around occupied dens, if any, and other measures as described in AMM1–AMM6,
19 AMM10, AMM24, AMM37, and Mitigation Measure BIO-162.

20 **NEPA Effects:** Implementation of the AMMs listed above Alternative 4 and Mitigation Measure BIO-
21 162 *Conduct Preconstruction Survey for American Badger*, would avoid the potential for substantial
22 adverse effects on San Joaquin kit fox or American badger, either indirectly or through habitat
23 modifications. These measures would also avoid and minimize effects that could substantially
24 reduce the number of San Joaquin kit fox or American badger, or restrict either species' range.
25 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on San Joaquin kit
26 fox or American badger.

27 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
28 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American
29 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative
30 4 construction, operation, and maintenance, the BDCP would avoid the potential for significant
31 ~~adverse effects~~impacts on either species, either indirectly or through habitat modifications, and
32 would not result in a substantial reduction in numbers or a restriction in the range of either species:
33 therefore, this impact would be less than significant. In addition, Mitigation Measure BIO-162, as
34 described above, would further reduce the ~~impact of potential for~~ indirect effects of Alternative 4 on
35 American badger ~~to a less-than-significant level.~~

36 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

37 Please see Mitigation Measure BIO-162 under Impact BIO-162.

38 **San Joaquin Pocket Mouse**

39 Habitat for San Joaquin pocket mouse consists of the grassland natural community throughout the
40 Plan Area. The species requires friable soils for burrowing. Construction and restoration associated
41 with Alternative 4 conservation measures would result in both temporary and permanent losses of
42 San Joaquin pocket mouse habitat as indicated in Table 12-4-60. Full implementation of Alternative

4 would also include the following conservation actions over the term of the BDCP that would likely benefit San Joaquin pocket mouse.

- Protect 8,000 acres of grasslands (GNC1.1, associated with CM3).
- Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands (GNC1.2, associated with CM8).
- Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water availability, soil chemistry, soil texture, topography, and disturbance regimes, with consideration of historical states (GNC2.1).

As explained below, with the restoration or protection of these amounts of habitat, Alternative 4's impacts on San Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Grassland	460506	460506	15815	15815	NA	NA
Total Impacts CM1		46050	46050	15815	1581	NA	NA
		6	6	1	51		
CM2-CM18	Grassland	889	2,057	239	273	385-1,277	514
Total Impacts CM2-CM18		889	2,057	239	273	385-1,277	514
TOTAL IMPACTS		1,3491	2,5172	39739	4314	385-1,277	514
		395	563	0	24		

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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. 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

Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket Mouse

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to ~~2,9482,987~~ acres of habitat for San Joaquin pocket mouse, of which ~~2,517-2,563~~ acres would be a permanent loss and ~~431-424~~ acres would be a temporary loss of habitat (Table 12-4-60).

1 Conservation measures that would result in these losses are conveyance facilities and transmission
2 line construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass*
3 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
4 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool Natural*
5 *Community and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural Community*
6 *Enhancement and Management*, and *CM18 Conservation Hatcheries*. The majority of habitat loss
7 would result from CM4. Habitat enhancement and management activities (CM11), which include
8 ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.
9 In addition, maintenance activities associated with the long-term operation of the water conveyance
10 facilities and other BDCP physical facilities could degrade or eliminate San Joaquin pocket mouse
11 habitat. Each of these individual activities is described below. A summary statement of the combined
12 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 13 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
14 result in the combined permanent and temporary loss of up to ~~618-657~~ acres of potential San
15 Joaquin pocket mouse habitat (~~460-506~~ acres of permanent loss, ~~158-151~~ acres of temporary
16 loss) in CZ 3–CZ 6 and CZ 8. The majority of grassland that would be removed would be in CZ 8,
17 from the modifications to Clifton Court Forebay. Refer to the Terrestrial Biology Map ~~B~~[Book in](#)
18 [Appendix A of this RDEIR/SDEIS](#) for a detailed view of Alternative 4 construction locations.
19 Construction of the forebay would affect the area where there is a record of San Joaquin pocket
20 mouse (California Department of Fish and Game 2012).
- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
22 (CM2) would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in
23 the Yolo Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the
24 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe
25 Drain/Tule Canal, and along the west side channels.
- 26 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
27 inundation would permanently remove an estimated 1,122 acres of potential San Joaquin pocket
28 mouse habitat. The majority of the losses would likely occur in the vicinity of Cache Slough, on
29 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
30 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
31 and fragment remaining grassland just north of Rio Vista in and around French and Prospect
32 Islands, and in an area south of Rio Vista around Threemile Slough.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
34 seasonally inundated floodplain would permanently and temporarily remove approximately 85
35 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary). These losses would
36 be expected to occur along the San Joaquin River and other major waterways in CZ 7.
- 37 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would impact 410 acres of
38 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and
39 seasonal floodplain restoration (399 acres).
- 40 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland
41 would be permanently converted to vernal pool complex. The vernal pool and alkali seasonal
42 wetland restoration would leave intact the grasslands surrounding the vernal pools. Temporary
43 construction-related disturbance of grassland habitat would result from implementation of *CM9*
44 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value
45 habitat after the construction periods.

- *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails and recreational staging areas would result in the permanent removal of 50 acres of grassland. The protection of 8,000 acres of grassland for covered species is expected to benefit San Joaquin pocket mouse by protecting existing habitats from potential loss or degradation that otherwise could occur with future changes in existing land use. Habitat management and enhancement-related activities could cause disturbance or direct mortality to San Joaquin pocket mouse if they are present near work areas.

A variety of habitat management actions included in *CM11 Natural Communities Enhancement and Management* that are designed to enhance wildlife values in restored or protected habitats could result in localized ground disturbances that could temporarily remove small amounts of San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and other infrastructure maintenance activities, would be expected to have minor adverse effects on habitat and would be expected to result in overall improvements to and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from management-related equipment operation could temporarily displace individuals or alter the behavior of the species if adjacent to work areas. With full implementation Alternative 4, enhancement and management actions designed for western burrowing owl would also be expected to benefit San Joaquin pocket mouse. San Joaquin pocket mouse would benefit particularly from protection of grassland habitat against potential loss or degradation that otherwise could occur with future changes in existing land use.

- *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San Joaquin pocket mouse habitat.
- *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground water conveyance facilities and restoration infrastructure could result in ongoing but periodic disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat. Maintenance activities would include vegetation management, levee and structure repair, and re-grading of roads and permanent work areas. These effects, however, would be reduced by AMMs and conservation actions as described below.
- *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket mouse if present in construction areas.

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

Near-Term Timeframe

Because the water conveyance facilities construction is being evaluated at the project level, the near-term BDCP conservation strategy has been evaluated to determine whether it would provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of construction would not be adverse under NEPA. The Plan would remove 1,7461,785 acres of San Joaquin pocket mouse habitat (1,3491,395 permanent, 397-390 temporary) in the study area in the near-term. One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the construction of the new forebay. These effects would result from the construction of the water conveyance facilities (CM1, 618-657 acres), and implementing other conservation measures (Yolo Bypass Fisheries Enhancement [CM2] Tidal Natural Communities Restoration [CM4], Seasonally Inundated Floodplain Restoration [CM5], Riparian Natural Community Restoration (CM7), Vernal

1 Pool and Alkali Seasonal Wetland Complex Restoration [CM9], Natural Community Enhancement
2 and Management – Recreation Facilities (CM11), and Conservation Hatcheries [CM18] 1,128 acres).

3 Typical NEPA project-level mitigation ratios for those natural communities affected by CM1 would
4 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that ~~1,236~~1,314
5 acres of grassland natural communities should be protected to mitigate the CM1 losses of ~~618~~
6 657 acres of San Joaquin pocket mouse habitat. The near-term effects of other conservation actions
7 would remove 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of
8 San Joaquin pocket mouse habitat using the same typical NEPA ratios (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 in CZ 1, 2, 4, 5, 7, 8, and 11. The protection and restoration of
11 grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
12 pool natural communities which would expand habitat for San Joaquin pocket mouse and reduce the
13 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
14 *and Management*, San Joaquin pocket mouse would likely benefit from the management of the
15 grasslands for general wildlife benefit.

16 These natural community biological goals and objectives would inform the near-term protection and
17 restoration efforts and represent performance standards for considering the effectiveness of
18 restoration actions for the species. The acres of protection and restoration contained in the near-
19 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
20 effects of CM1 especially considering that a large portion of the impacts to grasslands consists of
21 thin strips of grassland along levees and that areas of grassland protection and restoration would be
22 in large contiguous blocks.

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, Containments and*
26 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*
27 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs
28 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
29 areas and RTM storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and](#)
30 [Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is provided in](#)
31 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C.](#)

32 **Late Long-Term Timeframe**

33 The habitat model indicates that the study area supports approximately 78,047 acres of potential
34 habitat for San Joaquin pocket mouse. Alternative 4 as a whole would result in the permanent loss of
35 and temporary effects on ~~2,948~~2,987 acres of grasslands that could be suitable for San Joaquin
36 pocket mouse (4% of the habitat in the study area). The locations of these losses are described
37 above in the analyses of individual conservation measures. The Plan includes a commitment to
38 restore or create at least 2,000 acres of grassland in CZ 1, CZ 8, and CZ 11 (Objective GNC1.2) and to
39 protect 8,000 acres of grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in
40 CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2,
41 CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11 in the study area)(Objective GNC1.1). The Plan's commitment to
42 restore grasslands such that they connect fragmented patches of already protected grasslands
43 (GNC1.2) would improve habitat connectivity and dispersal abilities of San Joaquin pocket mouse

1 within and outside of the plan area. All protected habitat would be managed under *CM11 Natural*
2 *Communities Enhancement and Management*.

3 **NEPA Effects:** In the near-term, the loss of San Joaquin pocket mouse habitat and potential for direct
4 mortality would not be an adverse effect because the BDCP has committed to protecting and
5 restoring an acreage that would meet the typical mitigation ratios described above. In the absence of
6 other conservation actions, the effects on San Joaquin pocket mouse habitat and potential mortality
7 of a special-status species resulting from Alternative 4 would represent an adverse effect in the late
8 long-term. However, the BDCP has committed to habitat protection and restoration associated with
9 CM3, CM8, and CM11. This habitat protection and restoration would be guided by biological goals
10 and objectives and by AMM1–AMM6 and AMM10, which would be in place during construction.
11 Considering these commitments, losses of San Joaquin pocket mouse and potential mortality under
12 Alternative 4 would not be an adverse effect.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facilities 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 or restoration in an appropriate timeframe to ensure that the impacts of
18 construction would be less than significant. The Plan would remove ~~1,746~~~~1,785~~ acres of modeled
19 (~~1,349~~~~1,395~~ permanent, ~~397~~~~390~~ temporary) habitat for San Joaquin pocket mouse in the study area
20 in the near-term. One record of San Joaquin pocket mouse near Clifton Court forebay could be
21 affected by the construction of the new forebay. These effects would result from the construction of
22 the water conveyance facilities (CM1, ~~618~~~~657~~ acres), and implementing other conservation
23 measures (Yolo Bypass Fisheries Enhancement [CM2] Tidal Natural Communities Restoration
24 [CM4], Seasonally Inundated Floodplain Restoration [CM5], Riparian Natural Community
25 Restoration [CM7], Grassland Natural Community Restoration [CM8], Vernal Pool and Alkali
26 Seasonal Wetland Complex Restoration [CM9], Natural Community Enhancement and Management
27 – Recreation Facilities [CM11], and Conservation Hatcheries [CM18] 1,116 acres).

28 Typical CEQA project-level mitigation ratios for those natural communities affected by CM1 would
29 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that ~~1,236~~~~1,314~~
30 acres of grassland natural communities should be protected to mitigate the CM1 losses of ~~618~~~~657~~
31 acres of San Joaquin pocket mouse habitat.

32 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
33 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
34 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
35 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
36 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
37 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the
38 management of the grasslands for general wildlife benefit.

39 These natural community biological goals and objectives would inform the near-term protection and
40 restoration efforts and represent performance standards for considering the effectiveness of
41 restoration actions for the species. The acres of protection and restoration contained in the near-
42 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
43 effects of CM1 especially considering that a large portion of the impacted 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–AMM6, and AMM10. All of these AMMs
4 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
5 areas and RTM storage sites. The AMMs are described in detail in [Appendix 3.C, Avoidance and](#)
6 [Minimization Measures, of the Draft BDCP, and an updated version of AMM–6 is provided in](#)
7 [Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS](#)~~BDCP Appendix 3.C.~~

8 These commitments are more than sufficient to support the conclusion that the near-term effects of
9 Alternative 4 would be less than significant under CEQA. [No mitigation would be required.](#)

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 78,047 acres of potential
12 habitat for San Joaquin pocket mouse. Alternative 4 as a whole would result in the permanent loss of
13 and temporary effects on ~~2,948-2,987~~ acres of grasslands that could be suitable for San Joaquin
14 pocket mouse (4% of the habitat in the study area). The locations of these losses are described
15 above in the analyses of individual conservation measures. The Plan includes a commitment to
16 restore or create at least 2,000 acres of grassland in CZ 1, 8 and 11 (Objective GNC1.2) and to protect
17 8,000 acres of grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at
18 least 2,000 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5,
19 CZ 7,~~CZ~~, ~~8~~CZ 8, and CZ 11 in the study area) (Objective GNC1.1). The Plan’s commitment to restore
20 grasslands such that they connect fragmented patches of already protected grasslands (Objective
21 GNC1.2) would improve habitat connectivity and dispersal abilities of San Joaquin pocket mouse
22 within and outside of the plan area. All protected habitat would be managed under *CM11 Natural*
23 *Communities Enhancement and Management*.

24 Considering these protection and restoration provisions, which would provide acreages of new
25 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction
26 and restoration activities, and with implementation of AMM1–AMM6 and AMM10, the loss of habitat
27 or direct mortality through implementation of Alternative 4 would not result in a substantial
28 ~~adverse effects~~[significant impact](#) through habitat modifications and would not substantially reduce
29 the number or restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or
30 potential mortality under this alternative would have a less-than-significant impact on San Joaquin
31 pocket mouse.

32 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

33 Construction activities associated with water conveyance facilities, conservation components and
34 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
35 conveyance facilities, including the transmission facilities, could result in ongoing periodic
36 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and
37 its habitat over the term of the BDCP. These potential effects would be minimized and avoided
38 through AMM1–AMM6, and AMM10, which would be in effect throughout the plan’s construction
39 phase.

40 Water conveyance facilities operations and maintenance activities would include vegetation and
41 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
42 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance

1 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb
2 small areas of vegetation around maintained structures and could result in injury or mortality of
3 individual pocket mice, if present.

4 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial
5 adverse effects on San Joaquin pocket mouse, 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 pocket mouse, or restrict the species' range. Therefore, the indirect effects of
8 Alternative 4 would not have an adverse effect on San Joaquin pocket mouse.

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 pocket mouse. With
11 implementation of AMM1–AMM6, and AMM10, as part of Alternative 4 construction, operation, and
12 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,
13 either indirectly or through habitat modifications, and would not result in a substantial reduction in
14 numbers or a restriction in the range of the species. Therefore, the indirect effects under this
15 alternative would have a less-than-significant impact on San Joaquin pocket mouse. No mitigation
16 would be required.

17 **Special-Status Bat Species**

18 Special-status bat species with potential to occur in the study area employ varied roost strategies,
19 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as
20 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,
21 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats
22 roosting habitat includes valley/foothill riparian natural community, developed lands and
23 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all
24 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

25 There is potential for at least thirteen different bat species to be present in the study area (Figure
26 12-51), including four California species of special concern and nine species ranked from low to
27 moderate priority by the Western Bat Working Group (see Table 12A-2 in Appendix 12A, Special-
28 Status Species with Potential to Occur in the Study Area, of the Draft EIR/EIS). In 2009, DHCCP
29 conducted a large-scale effort that involved habitat assessments, bridge surveys, and passive
30 acoustic monitoring surveys for bats (see Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan
31 EIR/EIS Environmental Data Report, of the Draft EIR/EIS for details on methods and results, and
32 Table 12A-2 in Appendix 12A of the Draft EIR/EIS).

33 The majority of the parcels assessed during field surveys contained bat foraging and roosting
34 features and were considered highly suitable habitat, At the time of the 2009 field surveys, DWR
35 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not
36 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was
37 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was
38 observed at 26 of the bridges. Biologists observed Mexican free-tailed bats at four of the bridges and
39 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,
40 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second
41 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

42 The remaining 89 bridges contained structural features that were considered conducive to
43 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more

1 often have box beams or other less protected roosting spots where bats rest temporarily while
2 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where
3 bats are protected from predators and weather. Seventeen bridges in the survey area had no
4 potential for roosting because they lacked surface features from which bats could hang and offered
5 no protection from weather or predators.

6 Construction and restoration associated with Alternative 4 conservation measures would result in
7 both temporary and permanent losses of foraging and roosting habitat for special-status bats as
8 indicated in Table 12-4-61. Protection and restoration for special-status bat species focuses on
9 habitats and does not include manmade structures such as bridges. The conservation measures that
10 would be implemented to achieve the biological goals and objectives that would also benefit special-
11 status bats are summarized below.

- 12 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated
13 with CM3). This objective involves protecting and restoring a variety of habitat types described
14 below (see Table 3.3-14 in BDCP Chapter 3, *Conservation Strategy, of the Draft BDCP*).
 - 15 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
16 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
 - 17 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with CM3).
 - 18 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
 - 19 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and
20 CM11).
 - 21 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and
22 CM11).
 - 23 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant
24 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
 - 25 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
26 GNC1.2, associated with CM3 and CM8).
 - 27 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and CM9).
 - 28 ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated
29 with CM2 - CM4, 3, and 4).
 - 30 ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective
31 VFRNC1.1, associated with CM3 and CM7).
 - 32 ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
33 (Objective VFRNC1.2, associated with CM3).

34 As explained below, with the restoration and protection of these amounts of habitat, in addition to
35 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse
36 for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with Alternative 4^a

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT	CM2	CM5
CM1	Roosting	11955 679194	119194	14943 60661	14961	NA	NA
	Foraging	5,4434 744	5,4434.7 44	3,8013 731	3,801 3,731	NA	NA
Total Impacts CM1		5,5624 .938	5,5624. 938	3,9503 .792	3,950 3,792	NA	NA
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
Total Impacts CM2-CM18		15,021	61,696	940	2,338	21,589	10,548
TOTAL IMPACTS		20,583 19,959	67,5316 6,440	4,8904 .732	6,288 6,130	21,589	10,548

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species, of this RDEIR/SDEIS*, for a 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 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).

^d 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.

^e Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats

Alternative 4 conservation measure CM1 would result in the permanent and temporary loss combined of up to ~~268,255~~ acres of roosting habitat and ~~9,2448,475~~ acres of foraging habitat for special-status bats in the study area. DWR identified two bridges as potential night roosting habitat that could be affected by construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5) would result in the permanent and temporary loss of 1,782 acres of roosting habitat and the conversion of approximately 65,525 acres of foraging habitat from mostly cultivated lands and managed wetlands to tidal and nontidal wetlands. 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). Habitat enhancement and management activities (CM11) could result in local adverse effects. In addition, maintenance activities associated with the long-term operation of

1 the water conveyance facilities and other BDCP physical facilities could affect special-status bat
2 habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follows the
3 individual conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
5 result in the permanent loss of approximately ~~119,194~~ acres of roosting habitat and ~~5,4434,744~~
6 acres of foraging habitat in the study area. Development of the water conveyance facilities
7 would also result in the temporary removal of up to ~~149,61~~ acres of roosting habitat and up to
8 ~~3,83,73104~~ acres of foraging habitat for special-status bats in the study area (Table 12-4-61).
9 DWR identified two bridges with potential night roosting habitat in the forebay embankment
10 area and tunnel muck area that could be permanently affected by construction for CM1.
11 Additional roosting habitat affected by construction and operations includes valley/foothill
12 riparian natural community, developed lands and landscaped trees, including eucalyptus, palms
13 and orchards.
- 14 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
15 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be
16 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and
17 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony
18 of Mexican free-tailed bats located at both ends of the Yolo Causeway ~~bridge~~ Bridge could also be
19 affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct*
20 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that
21 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 22 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
23 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into
24 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting
25 habitat for special-status bats would permanently affected. This habitat is of low value,
26 consisting of a small, isolated patch surrounded by cultivated lands, and the species have a
27 relatively low likelihood of being present in these areas. The roosting habitat that would be
28 removed consists of relatively small and isolated patches along canals and irrigation ditches
29 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small
30 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*
31 *Surveys for Roosting Bats and Implement Protective Measures*, requires that tidal natural
32 communities restoration avoid effects on roosting special-status bats.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
34 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into
35 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent
36 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status
37 bats in the study area.
- 38 • *CM11 Natural Communities Enhancement and Management*: Implementation of the plan would
39 result in an overall benefit to special-status bats within the study area through protection and
40 restoration of their foraging and roosting habitats. The majority of affected acres would convert
41 agricultural land to natural communities with higher potential foraging and roosting value, such
42 as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored foraging
43 habitats primarily would replace agricultural lands. Restored habitats are expected to be of
44 higher function because the production of flying insect prey species is expected to be greater in
45 restored wetlands and uplands on which application of pesticides would be reduced relative to

1 affected agricultural habitats. Noise and visual disturbances during implementation of riparian
2 habitat management actions could result in temporary disturbances that, if bat roost sites are
3 present, could cause temporary abandonment of roosts. This effect would be minimized with
4 implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*
5 *Bats and Implement Protective Measures*.

- 6 • Operations and maintenance: Ongoing facilities operation and maintenance is expected to have
7 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of
8 the above-ground water conveyance facilities and restoration infrastructure could result in
9 ongoing but periodic disturbances that could affect special-status bat use of the surrounding
10 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ
11 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,
12 levee and structure repair, and regrading of roads and permanent work areas. These effects,
13 however, would be minimized with implementation of the mitigation measures described
14 below.
- 15 • Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,
16 such as grading, the movement of construction vehicles or heavy equipment, and the installation
17 of water conveyance facilities components and new transmission lines, may result in the direct
18 mortality, injury, or harassment of roosting special-status bats. Construction activities related to
19 conservation components could have similar effects. Preconstruction surveys would be
20 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed
21 while bats are present, as described below in the mitigation measures.

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 CEQA conclusions are
24 also included.

25 ***Near-Term Timeframe***

26 Because water conveyance facilities construction is being evaluated at the project level, the near-
27 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
28 protection or restoration in an appropriate timeframe to ensure that the construction effects would
29 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land
30 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and
31 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting
32 habitat resulting for CM1, CM2, and CM4.

33 Alternative 4 would permanently or temporarily affect 959-946 acres of roosting habitat for special-
34 status bats in the near-term as a result of implementing CM1 (268-255 acres roosting habitat), CM2
35 (256 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur
36 in the late long-term. Most of the roosting habitat losses would occur in ana valley/foothill riparian.
37 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
38 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian
39 natural community. Using these ratios would indicate that 959-946 acres of riparian habitat should
40 be restored and 959-946 acres of riparian habitat should be protected.

41 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
42 bats within the study area through protection and restoration of their foraging and roosting habitats
43 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
44 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities

1 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
2 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
3 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
4 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
5 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored
6 habitats are expected to be of higher function because the production of flying insect prey species is
7 expected to be greater in restored wetlands and uplands on which application of pesticides would
8 be reduced relative to affected agricultural habitats. Conservation components in the near-term
9 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 4.

10 In addition, activities associated with natural communities enhancement and protection and with
11 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
12 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
13 described below, requires preconstruction surveys to reduce these effects.

14 The BDCP also contains 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 AMM10 Restoration of Temporarily Affected Natural Communities. These AMMs include*
19 *elements that avoid or minimize the risk of construction activity affecting habitat and species*
20 *adjacent to work areas and storage sites. The AMMs are described in detail in [Appendix 3.C,](#)*
21 *[Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of AMM-6 is](#)*
22 *[provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP Appendix 3.C,](#)*
23 *[Avoidance and Minimization Measures.](#)*

24 **Late Long-Term Timeframe**

25 Alternative 4 as a whole would affect 2,0502,037 acres of roosting habitat (Table 12-4-61). Because
26 the majority of affected acres would convert agricultural land to natural communities with higher
27 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
28 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
29 in the late long-term.

30 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
31 status bats within the study area through protection and restoration of approximately 142,200 acres
32 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
33 protect the highest quality natural communities and covered species habitat in the Plan Area to
34 optimize the ecological value of the reserve system for conserving covered species and native
35 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
36 community acreage targets. Achieving this objective is intended to protect and restore natural
37 communities, species-specific habitat elements, and species diversity on a landscape-scale.
38 Achieving this objective is also intended to conserve representative natural and seminatural
39 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
40 ecosystem function, and biological diversity.

41 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
42 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
43 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
44 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,

1 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
2 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
3 higher function because the production of flying insect prey species is expected to be greater in
4 restored wetlands and uplands on which application of pesticides would be reduced relative to
5 affected agricultural habitats.

6 Should any of the special-status bat species be detected roosting in the study area, construction of
7 water conveyance facilities and restoration activities would have an adverse effect on roosting
8 special-status bats. Noise and visual disturbances and the potential for injury or mortality of
9 individuals associated within implementation of the restoration activities on active roosts would be
10 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*
11 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently
12 offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

13 **NEPA Effects:** In the near-term, the losses of roosting habitat for special-status bats associated with
14 implementing Alternative 4 are not expected to result in substantial adverse effects on special-status
15 bats, either directly or through habitat modifications, and would not result in a substantial reduction
16 in numbers or a restriction in the range of special-status bats because the BDCP has committed to
17 protecting the acreage required to meet the typical mitigation ratios described above. In the late
18 long-term, the losses of roosting habitat for special-status bats, in the absence of other conservation
19 actions, would represent an adverse effect as a result of habitat modification and potential direct
20 mortality of a special-status species. However, with habitat protection and restoration associated
21 with the conservation components, guided by landscape-scale goals and objectives and by AMM1-
22 AMM6, and AMM10, and with implementation of Mitigation Measure BIO-166, the effects of
23 Alternative 4 as a whole on special-status bats would not be adverse.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because water conveyance facilities construction is being evaluated at the project level, the near-
27 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
28 protection or restoration in an appropriate timeframe to ensure that the construction impacts
29 would be less than significant for CEQA purposes. Because the majority of affected acres would
30 convert agricultural land to natural communities with higher potential foraging and roosting value,
31 such as riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses
32 only on losses to roosting habitat for CM1, CM2, and CM4.

33 Alternative 4 would permanently or temporarily affect 959-946 acres of roosting habitat for special-
34 status bats in the near-term as a result of implementing CM1 (268-255 acres roosting habitat), CM2
35 (256 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur
36 in the late long-term. Most of the roosting habitat losses would occur in ana valley/foothill riparian.

37 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
38 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian
39 natural community. Using these ratios would indicate that 959-946 acres of riparian habitat should
40 be restored and 959-946 acres of riparian habitat should be protected.

41 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
42 bats within the study area through protection and restoration of their foraging and roosting habitats
43 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and

1 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
2 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
3 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
4 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
5 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
6 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored
7 habitats are expected to be of higher function because the production of flying insect prey species is
8 expected to be greater in restored wetlands and uplands on which application of pesticides would
9 be reduced relative to affected agricultural habitats. Conservation components in the near-term
10 would sufficiently offset the ~~adverse effects~~significant impacts resulting from near-term effects from
11 Alternative 4.

12 In addition, activities associated with natural communities enhancement and protection and with
13 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
14 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
15 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant
16 level.

17 The permanent loss of roosting habitat from Alternative 4 would be mitigated through
18 implementation of Mitigation Measure BIO-166, which would include protective measures to ensure
19 there is no significant impact under CEQA on roosting special-status bats, either directly or through
20 habitat modifications and no substantial reduction in numbers or a restriction in the range of
21 special-status bats. The BDCP also contains commitments to implement AMM1-6 and AMM10.
22 These AMMs include elements that avoid or minimize the risk of construction activity affecting
23 habitat and species adjacent to work areas and storage sites. The AMMs are described in detail in
24 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP, and an updated version of
25 AMM-6 is provided in Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS~~BDCP Appendix~~
26 3.C, Avoidance and Minimization Measures.

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

28 Alternative 4 as a whole would affect ~~2,050~~2,037 acres of roosting habitat (Table 12-4-61). Because
29 the majority of affected acres would convert agricultural land to natural communities with higher
30 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
31 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
32 in the late long-term.

33 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
34 status bats within the study area through protection and restoration of approximately 142,200 acres
35 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
36 protect the highest quality natural communities and covered species habitat in the Plan Area to
37 optimize the ecological value of the reserve system for conserving covered species and native
38 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
39 community acreage targets. Achieving this objective is intended to protect and restore natural
40 communities, species-specific habitat elements, and species diversity on a landscape-scale.
41 Achieving this objective is also intended to conserve representative natural and seminatural
42 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
43 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~~ a significant
12 impact on roosting special-status bats. Noise and visual disturbances and the potential for injury or
13 mortality of individuals associated within implementation of the restoration activities on active
14 roosts would be minimized with implementation of Mitigation Measure BIO-166, *Conduct*
15 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*. Conservation
16 components would sufficiently offset the ~~adverse effects~~ significant impacts resulting from late long-
17 term effects from CM1, CM2, CM4, and CM5.

18 The permanent loss of roosting habitat from Alternative 4 would be mitigated through
19 implementation of Mitigation Measure BIO-166, which would include protective measures to ensure
20 there is no significant impact on roosting special-status bats, either directly or through habitat
21 modifications, and no substantial reduction in numbers or a restriction in the range of special-status
22 bats. Therefore, Alternative 4 would not result in a significant impact on special-status bats under
23 CEQA.

24 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
25 **Implement Protective Measures**

26 The following measure was designed to avoid and minimize adverse effects on special-status
27 bats. However, baseline data are not available or are limited on how bats use the study area, and
28 on individual numbers of bats and how they vary seasonally. Therefore, it is difficult to
29 determine if there would be a substantial reduction in species numbers. Bat species with
30 potential to occur in the study area employ varied roost strategies, from solitary roosting in
31 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and
32 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest
33 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include
34 these components.

- 35 • Identification of potential roosting habitat within project area.
- 36 • Daytime search for bats and bat sign in and around identified habitat.
- 37 • Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or
38 active full-spectrum acoustic monitoring where species identification is sought.
- 39 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from
40 dusk to dawn over multiple nights.
- 41 • Additional on-site night surveys as needed following passive acoustic detection of special
42 status bats to determine nature of bat use of the structure in question (e.g., use of structure
43 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 nights within the season that construction would be taking place. Methodology should follow that described above for the bridge emergence survey.

1 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector
2 will be used to assist in determining species present. These surveys would be conducted in
3 coordination with the acoustic monitoring conducted for the bridge/structure.

4 ***Protective Measures for Bats using Bridges/Structures and Trees***

5 Avoidance and minimization measures may be necessary if it is determined that bats are using
6 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during
7 acoustic monitoring. Appropriate measures will be determined in coordination with CDFW and
8 may include measures listed below.

- 9 • Disturbance of the bridge will be avoided between April 15 and September 15 (the
10 maternity period) to avoid impacts on reproductively active females and dependent young.
- 11 • Installation of exclusion devices from March 1 through April 14 or September 15 through
12 October 30 to preclude bats from occupying the bridge during construction. Exclusionary
13 devices will only be installed by or under the supervision of an experienced bat biologist.
- 14 • Tree removal will be avoided between April 15 and September 15 (the maternity period) to
15 avoid impacts on pregnant females and active maternity roosts (whether colonial or
16 solitary).
- 17 • ~~All tree removal will be conducted between September 15 and October 30, which~~
18 ~~corresponds to a time period when bats would not likely have entered winter hibernation~~
19 ~~and would not be caring for flightless young. If weather conditions remain conducive to~~
20 ~~regular bat activity beyond October 30th, later tree removal may be considered in~~
21 ~~consultation with CDFW.~~
- 22 • ~~would.~~
- 23 • Trees will be removed in pieces, rather than felling the entire tree.
- 24 • If a maternity roost is located, whether solitary or colonial, that roost will remain
25 undisturbed with a buffer as determined in consultation with CDFW until September 15 or
26 until a qualified biologist has determined the roost is no longer active.
- 27 • If a non-maternity roost is found, that roost will be avoided and an appropriate buffer
28 established in consultation with CDFW. Every effort should be made to avoid the roost, as
29 methods to evict bats from trees are largely untested. However, if the roost cannot be
30 avoided, eviction would be attempted and procedures designed in consultation with CDFW
31 to reduce the likelihood of mortality of evicted bats. In all cases:
 - 32 ○ Eviction will not occur before September 15th and will match the timeframe for tree
33 removal approved by CDFW.
 - 34 ○ Qualified biologists will carry out or oversee the eviction tasks and monitor the tree
35 trimming/removal.
 - 36 ○ Eviction will take place late in the day or in the evening to reduce the likelihood of
37 evicted bats falling prey to diurnal predators.
 - 38 ○ Eviction will take place during weather and temperature conditions conducive to bat
39 activity.
 - 40 ○ Special-status bat roosts would not be disturbed.

- 1 Eviction procedures may include but are not limited to:
- 2 ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent
3 mitigation requirements. Relevant data may include the species, sex, reproductive status
4 and/or number of bats using the roost, and roost conditions themselves such as
5 temperature and dimensions. Surveys may include visual emergence, night vision,
6 acoustic, and/or capture.
 - 7 ○ Structural changes may be made to the roost, performed without harming bats, such
8 that the conditions in the roost are undesirable to roosting bats and the bats leave on
9 their own (e.g., open additional portals so that temperature, wind, light and
10 precipitation regime in the roost change).
 - 11 ○ Noninjurious harassment at the roost site to encourage bats to leave on their own, such
12 as ultrasound deterrents or other sensory irritants.
 - 13 ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed
14 roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and
15 several minutes should pass before felling trees or trimming limbs to allow bats time to
16 arouse and leave the tree. The biologists should search downed vegetation for dead and
17 injured bats. The presence of dead or injured bats would be reported to CDFW.

18 Compensatory mitigation for the loss of roosting habitat will also be determined through
19 consultation with CDFW and may include the construction and installation of suitable
20 replacement habitat onsite. Depending on the species and type of roost lost, various roost
21 replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting
22 cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural
23 habitat onsite is generally preferable to artificial.

24 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as
25 possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat
26 may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat
27 when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona
28 Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine
29 trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record
30 but information is mounting on how to create successful houses. There is no single protocol or
31 recipe for bat-house success. Careful study of the roost requirements of the species in question;
32 the particular conditions at the lost roost site including temperature, orientation of the
33 openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase
34 the chances of designing a successful replacement.

35 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat
36 activity has been positively correlated with increased vegetation and tree growth, canopy
37 complexity and restoration acreage at cottonwood-willow restoration sites along the Lower
38 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide
39 a wider range of bat species with preferred roost types, including both foliage-roosting and
40 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 (as revised
16 in Appendix D, Substantive BDCP Revisions, in this RDEIR/SDEIS)* describes the process by which
17 tidal natural communities restoration may increase methyl mercury levels in wetlands in the study
18 area. Mercury has been found in high concentrations in some bat species, such as the Indiana bat.
19 Many bat species forage heavily on aquatic insects, which might result in rapid bioaccumulation
20 (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are expected to reduce
21 the effects of methylmercury on special-status bat species resulting from BDCP tidal natural
22 communities restoration.

23 **NEPA Effects:** Implementation of the Mitigation Measure BIO-~~166 for~~166 for special-status bats and
24 *Environmental Commitment 12 Methylmercury Management* would avoid the potential for
25 substantial adverse effects on roosting special-status bats, either indirectly or through habitat
26 modifications. This mitigation measure would also avoid and minimize effects that could
27 substantially reduce the number of special-status bats, or restrict species' range. Therefore, the
28 indirect effects of Alternative 4 would not have an adverse effect on special-status bats.

29 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as
30 well as construction-related noise and visual disturbances could have a significant impact on
31 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure
32 BIO-166 ~~and *Environmental Commitment 12 Methylmercury, Conduct Preconstruction Surveys for*~~
33 ~~*Roosting Bats and Implement Protective Measures, would*~~ *Management would* reduce this impact to a
34 less-than-significant level ~~and by implementing protective measures~~ measures to ensure that
35 Alternative 4 would not result in a substantial reduction in numbers or a restriction in the range of
36 species.

37 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
38 **Implement Protective Measures**

39 See Mitigation Measure BIO-166 under Impact BIO-166.

1 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
4 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study
5 area (Table 12-4-61).

6 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of
7 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-4-61).
8 Potential roosting trees are likely to be retained within seasonally flooded areas, although high
9 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging
10 habitat for the species. The overall effect of seasonal inundation in existing riparian natural
11 communities may instead be beneficial. Historically, flooding was the main natural disturbance
12 regulating ecological processes in riparian areas, and flooding promotes the germination and
13 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas
14 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat
15 for special-status bats that use riparian habitats.

16 **NEPA Effects:** The periodic losses of roosting and foraging habitat for special-status bats associated
17 with implementing Alternative 4 are not expected to result in substantial adverse effects on special-
18 status bats, either directly or through habitat modifications and would not result in a substantial
19 reduction in numbers or a restriction in the range of special-status bats. Mitigation Measure BIO-
20 166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, is
21 available to address any effects of periodic inundation on special-status bats and roosting habitat.
22 Therefore, Alternative 4 would not adversely affect the species.

23 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would
24 periodically affect foraging and roosting habitat for special-status bats in the study area, which could
25 result in a significant impact. Any impact of periodic inundation on special-status bats would be
26 mitigated through implementation of Mitigation Measure BIO-166, which would include protective
27 measures to ensure there is no significant impact on roosting special-status bats, either directly or
28 through habitat modifications and no substantial reduction in numbers or a restriction in the range
29 of special-status bats.

30 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
31 **Implement Protective Measures**

32 See Mitigation Measure BIO-166 under Impact BIO-166.

1 Plant Species

2 Vernal Pool ~~Plants~~Species

3 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in
4 the study area (Tables 12-2 and 12-3, summarized in Table 12-4-62). The vernal pool habitat model
5 used for the impact analysis [on vernal pool species](#) was based on vegetation types and associations
6 from various data sets which were used to create maps showing the distribution of vernal pool
7 habitat in the study area according to three habitat types in which these species are known to occur,
8 including vernal pool complex, degraded vernal pool complex, and alkali seasonal wetland habitat.
9 Vernal pool complex habitat consists of vernal pools and uplands that display characteristic vernal
10 pool and swale visual signatures that have not been significantly impacted by agricultural or
11 development practices. Degraded vernal pool complex habitat consists of habitat that ranges from
12 areas with vernal pool and swale visual signatures that display clear evidence of significant
13 disturbance due to plowing, discing, or leveling to areas with clearly artificial basins such as shallow
14 agricultural ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because
15 wetlands in the degraded vernal pool complex are inundated during the wet season and may have
16 historically been located in or near areas with natural vernal pool complex, they may support
17 individuals or small populations of species that are found in vernal pools and swales. However, they
18 do not possess the full complement of ecosystem and community characteristics of natural vernal
19 pools, swales and their associated uplands and they are generally ephemeral features that are
20 eliminated during the course of normal agricultural practices. A small amount of alkali seasonal
21 wetland habitat was included in the model because alkaline vernal pools are also present in some
22 areas mapped as alkali seasonal wetland.

23 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat
24 affinities, and because vernal pool habitat within the study area is highly heterogeneous with
25 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly
26 overestimates the extent of habitat in the study area occupied by each species. However, the vernal
27 pool habitat model is likely to encompass all or most of the potential area within which special-
28 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent
29 of occupied habitat or to underestimate the effects of Alternative 4.

30 Full implementation of Alternative 4 would include the following conservation actions over the term
31 of the BDCP to benefit covered vernal pool plant [species](#) (~~BDCP-see~~ Chapter [3, Section 3.3,](#)
32 [Conservation Strategy Biological Goals and Objectives, of the Draft BDCP](#)).

- 33 ● Protect at least two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills
34 or Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- 35 ● Maintain no net loss of Heckard's peppergrass in Conservation Zones 1, 8, or 11 within
36 restoration sites or within the area of affected tidal range of restoration projects (Objective
37 VPP1.2, associated with CM3 and CM9).

38 The construction and restoration activities covered under Alternative 4 could have impacts on
39 special-status vernal pool plant [species](#). Modeled habitat is within the proposed footprint for the
40 Alternative 4 water conveyance facilities and within the hypothetical footprint for restoration
41 activities. One known occurrence of a covered plant species is within the proposed footprint for the
42 Alternative 4 water conveyance facilities. Table 12-4-62 summarizes the acreage of modeled vernal

1 pool habitat in the study area and the number of occurrences of each special-status vernal pool **plant**
2 **species** in the study area.

3 **Table 12-4-62. Summary of Impacts on Vernal Pool Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Vernal pool complex	9,557	23	=0	=0	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Degraded vernal pool complex	2,576	380	=0	=0	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Alkali Seasonal Wetland	188	2	=0	=0	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Total	12,321	405	=0	=0	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Covered Species					
Alkali milk-vetch	=0	=0	16	1	Population loss from construction of the water conveyance facilities
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 ^a	0	None
Noncovered Species					
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	4	0	None
Delta woolly marbles	=0	=0	3	0	None
Saline clover	=0	=0	9	0	None
Solano grass	=0	=0	1	0	None
^a One additional occurrence is in alkali seasonal wetlands.					

4

1 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

2 Under Alternative 4, conservation measures would affect habitat for special-status vernal pool
3 plants-species and one occurrence of a noncovered vernal pool plantspecies.

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

- 7 • *CM1 Water Facilities and Operations*: Thirty-four acres of modeled vernal pool habitat, 19.4 acres
8 of critical habitat for Contra Costa goldfields, and one known occurrence of the 17 vernal pool
9 plants-species are within the proposed footprint for the Alternative 4 water conveyance
10 facilities. One occurrence of alkali milk-vetch in CZ 8 would be crossed by an electric
11 transmission line. Under Alternative 4, construction and operation of the water conveyance
12 facilities could affect undiscovered occurrences of the five covered vernal pool plants-species or
13 the 12 noncovered special-status plantspecies.

14 The east-west transmission line would not affect four covered vernal pool species that occur in
15 the study area. One occurrence each of dwarf downingia, legenere, Heckard's peppergrass, and
16 Boggs Lake hedge-hyssop are within the east-west transmission line study area. However, the
17 transmission line would not cross any of the occurrences.

- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known
19 occurrences of the 17 vernal pool plant species are within the hypothetical footprint for
20 construction or operation of the Yolo Bypass fisheries enhancements. Therefore, construction
21 and operation of CM2 would not affect the 17 covered or noncovered vernal pool plantspecies.
- 22 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered
23 vernal pool plants-species by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11
24 (Objective VPNC1.1). The protected vernal pool habitat would be managed and enhanced to
25 sustain populations of native vernal pool species. These benefits also would accrue to any
26 noncovered vernal pool plants-species occurring in the protected vernal pool complex.
- 27 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the
28 inundation of 372 acres of vernal pool complex and would, therefore, potentially affect special-
29 status vernal pool plantspecies. However, most of this habitat (370 acres) consists of degraded
30 vernal pool habitat that is unlikely to contain special-status plantspecies. In addition, 257.8
31 acres of critical habitat for Contra Costa goldfields could be affected. No known occurrences of
32 covered or noncovered vernal pool plants-species would be affected by tidal restoration.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of
34 special-status vernal pool plants-species are present within areas proposed for floodplain
35 restoration. Therefore, floodplain restoration and construction of new floodplain levees would
36 have no impacts on covered and noncovered vernal pool plantspecies.
- 37 • *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status
38 vernal pool plants-species are present within areas proposed for channel margin habitat
39 enhancement. Therefore, channel margin habitat enhancement would have no impacts on
40 covered and noncovered vernal pool plantspecies.
- 41 • *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-
42 status vernal pool plant species are present within areas proposed for riparian habitat

1 enhancement. Therefore, riparian habitat enhancement would have no impacts on covered and
2 noncovered vernal pool ~~plants~~species.

- 3 • *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat
4 includes grassland matrix within which the vernal pools occur, grassland restoration activities
5 would take place in nongrasslands (ruderal habitat, cultivated land) or degraded grasslands that
6 are not included within vernal pool complex habitat. Therefore, grassland communities
7 restoration would have no impacts on covered and noncovered vernal pool plant ~~plants~~species.
- 8 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen
9 circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be
10 implemented to compensate for that loss. Because vernal pool complex restoration would focus
11 on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the
12 likelihood of affecting any special-status vernal pool plant ~~plants~~species would be low. However,
13 vernal pool restoration could adversely affect remnant populations of special-status vernal pool
14 ~~plants~~species or affect vernal pool habitat adjacent to the restoration areas.
- 15 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
16 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool
17 habitat and would have no impacts on covered and noncovered vernal pool plant ~~plants~~species.
- 18 • ~~CM22~~ *Avoidance and Minimization Measures*: Effects on covered vernal pool plant ~~plants~~species
19 potentially resulting from implementation of Alternative 4 would be avoided or minimized
20 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
21 *Monitoring*, *AMM12 Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and Alignment*
22 *Guidelines*, and *AMM37 Recreation*. AMM11 prohibits ground disturbance or hydrologic
23 disturbance within 250 feet of existing vernal pools. In addition, AMM11 specifies that
24 individual projects be designed to avoid critical habitat for listed plant and wildlife vernal pool
25 species. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than 10
26 wetted acres and the indirect effect to no more than 20 wetted acres through the life of the Plan.
27 AMM12 also requires that that tidal natural communities restoration or other ground-disturbing
28 covered activities in Conservation Zones 1 and 11 will not result in the adverse modification of
29 primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy
30 shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat
31 for Contra Costa goldfields, where it overlaps with critical habitat for these vernal pool
32 crustaceans. AMM30 specifies that the alignment of proposed transmission lines will be
33 designed to avoid sensitive terrestrial and aquatic habitats when siting poles and towers, to the
34 maximum extent feasible. AMM37 requires that new recreation trails avoid populations of
35 covered vernal pool plant ~~plants~~species.

36 In addition, the BDCP includes species-specific goals to benefit covered vernal pool plant ~~plants~~species.
37 This includes protecting two occurrences of alkali milk-vetch (Objective VPP1.1) and requiring no
38 net loss of Heckard's peppergrass occurrences (Objective VPP1.2).

39 In summary, no adverse effects on special-status vernal pool plant ~~plants~~species would be expected from
40 implementing Alternative 4. Construction of the water conveyance facilities could affect one species,
41 alkali milk-vetch, although adverse effects on this species would be avoided or minimized through
42 implementation of AMM11 and AMM30. No other known occurrences of special-status vernal pool
43 plant ~~plants~~species would be affected under Alternative 4. Beneficial effects on special-status vernal pool

1 plants-species could occur by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 and by
2 protecting occurrences of alkali milk-vetch.

3 The GIS analysis estimated that up to 403-405 acres of vernal pool complex could be adversely
4 affected by covered activities. However, the actual effect on habitat for special-status vernal pool
5 plant species is expected to be much less than the estimated impact because the BDCP limits the
6 total loss of wetted vernal pool habitat resulting from specific projects to 10 acres (approximately
7 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed restoration ratios
8 of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal
9 pool complex restoration would be required to compensate for the loss of modeled habitat for
10 special-status vernal pool plants-species (Objective VPNC1.2, associated with CM9). This would be
11 consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts. The
12 limitation on the loss of wetted vernal pool habitat will constrain the implementation of tidal
13 restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of
14 restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

15 **NEPA Effects:** The loss of modeled habitat for vernal pool plant species would be minimized by
16 AMM12 and offset through CM9, and effects of constructing CM1 on one occurrence of alkali milk-
17 vetch would be avoided through AMM30. Therefore, Alternative 4 would not result in adverse
18 effects on covered and noncovered vernal pool plant species.

19 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plant species would be offset
20 through restoration, and because impacts on occurrences of covered vernal pool plants would be
21 avoided, implementation of Alternative 4 would not result in a reduction in the range or numbers of
22 17 covered and noncovered special-status vernal pool plants-species in the study area. Therefore,
23 impacts on covered and noncovered vernal pool plant species would be less than significant. No
24 mitigation is required.

25 **Alkali Seasonal Wetland PlantsSpecies**

26 Five covered species and three noncovered plants-species occur in alkali seasonal wetlands in the
27 study area (Tables 12-2, 12-3, summarized in Table 12-4-63). Alkali seasonal wetland habitat was
28 modeled separately for four covered plant species occurring in seasonal alkali wetlands.

29 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin
30 spearscale habitat in the study area according to the species' preferred habitat types, intersected
31 with soil series and slope position. Historical and current records of San Joaquin spearscale in the
32 study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or
33 swale microtopography along the western border of the study area. The vegetation cover of the
34 alkaline soils is typically a combination of alkaline soil-adapted species and annual grasses,
35 including annual ryegrass and Mediterranean barley. Habitat types used for the model included
36 alkali seasonal wetlands, vernal pool complex, and grasslands. Soil series used in the model
37 consisted of either clays or clay loams with alkaline horizons. San Joaquin spearscale typically
38 occurs in swales or in level terrain but occasionally occurs on the lower slopes adjacent to streams
39 or swales or where seeps are present. Because some of the soil series with which San Joaquin
40 spearscale is associated can occur on hillsides, slope was used to limit the extent of the model to the
41 toe of the slope where these soils occur by excluding areas with slope greater than 1%. Land uses
42 that are incompatible with the species' habitat requirements, such as modeled habitat polygons
43 falling on leveled or developed 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 4 would include the following conservation actions over the term
24 of the BDCP to benefit covered alkali seasonal wetland ~~plants-species~~ (~~BDCP see Chapter 3, Section~~
25 ~~3.3, Conservation Strategy Biological Goals and Objectives, of the Draft BDCP~~).

- 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 4 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
37 ~~heartseale~~ [San Joaquin spearscale](#) and Heckard's peppergrass could be affected by tidal habitat
38 restoration. No adverse effects on palmate-bracted bird's-beak or recurved larkspur would be
39 expected. Table 12-4-63 summarizes the acreage of modeled alkali seasonal wetland habitat in the
40 study area and the number of occurrences of each special-status alkali seasonal wetland ~~plant~~
41 ~~species~~ in the study area.

1 **Table 12-4-63. Summary of Impacts on Seasonal Alkali Wetland Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
San Joaquin spearscale modeled habitat	14,933	761	=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 ^a	95108	=0	=0	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	75	=0	=0	Habitat loss from <u>construction of water conveyance facilities</u> , tidal restoration and Yolo Bypass Fisheries enhancements
Covered Species					
San Joaquin spearscale	=0	=0	19	12	Population loss from <u>construction of water conveyance facilities and</u> tidal habitat restoration
Brittlescale	=0	=0	8	0	None
Heartscale	=0	=0	3	0	None
Delta button-celery	=0	=0	1 ^b	0	None
Heckard's peppergrass	=0	=0	1 ^c	1	Population loss from tidal habitat restoration
Noncovered Species					
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
^a A portion of this acreage consists of riparian habitat. ^b A second occurrence in study area is in riparian habitat. ^c 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 Species**

2 Alternative 4 would have adverse effects on modeled habitat for San Joaquin spearscale, brittlescale,
3 heartscale, and Delta button-celery. It would also have adverse effects on occurrences of San Joaquin
4 spearscale, Heckard's peppergrass, and crownscale.

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:* Under Alternative 4, construction of the Byron Tract
9 Forebay would permanently remove ~~6978~~ acres of modeled habitat for San Joaquin spearscale
10 and ~~18108~~ acres of modeled habitat for Delta button-celery. This could be an adverse effect,
11 depending on whether or not the affected modeled habitat is actually occupied by the species.
12 Modeled habitat is assumed to encompass all potential habitat for a species and may therefore
13 overestimate the area actually occupied. One known occurrence of San Joaquin spearscale near
14 the forebay would be affected by facilities construction. Delta button-celery is not known to
15 occur in CZ 8; the nearest known occurrence, in CZ 9, would not be affected.

16 Construction of the water conveyance facilities would permanently remove ~~0.2~~ about 1.5 acre of
17 habitat occupied by crownscale at the Byron Tract Forebay. ~~Part of the occurrence would be~~
18 ~~removed, but~~ All or most of the occurrence would ~~not~~ be directly affected. ~~However, a reduction~~
19 ~~of the population size, both in area and number of individuals present, would be an adverse~~
20 ~~impact.~~

21 Construction of the water conveyance facilities would not affect brittlescale, heartscale,
22 Heckard's peppergrass, palmate-bracted bird's-beak, or recurved larkspur.

- 23 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass improvements would
24 permanently remove 56 acres of modeled habitat for San Joaquin spearscale. No known
25 occurrences of San Joaquin spearscale would be affected. No modeled habitat and no known
26 occurrences of the seven other alkali seasonal wetland plants species are within the
27 hypothetical footprint for construction or operation of the Yolo Bypass fisheries enhancements.

- 28 • *CM3 Natural Communities Protection and Restoration:* Alternative 4 would benefit alkali seasonal
29 wetland plants species by protecting 150 acres of alkali seasonal wetland in Conservation Zones
30 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and enhanced
31 to sustain populations of native plant species.

- 32 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration is expected to convert
33 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.
34 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale
35 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat
36 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP
37 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat
38 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of
39 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is
40 actually occupied by these species is not known; modeled habitat is assumed to encompass all
41 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal
42 habitat restoration could adversely affect an occurrence of Heckard's peppergrass at Hass
43 Slough and an occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These
44 occurrences are based on historic records, and the whether or not the populations still exist is

- 1 not known. In each case, the loss of modeled habitat and occurrences for covered species would
2 be adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved
3 larkspur would not be affected by tidal habitat restoration.
- 4 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
5 would result in the removal of 25 acres of modeled habitat for San Joaquin spearscale, including
6 3 acres subject to periodic flooding. No known occurrences of San Joaquin spearscale would be
7 affected. No other alkali seasonal wetland habitat or occurrences of special-status alkali seasonal
8 wetland plants-species are present within areas proposed for floodplain restoration. Therefore,
9 floodplain restoration and construction of new floodplain levees would have no impacts on
10 covered and noncovered alkali seasonal wetland plant species.
 - 11 ● *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-
12 status alkali seasonal wetland plant species are present within areas proposed for channel
13 margin habitat enhancement. Therefore, channel margin habitat enhancement would have no
14 impacts on covered and noncovered alkali seasonal wetland plants-species.
 - 15 ● *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences
16 of special-status alkali seasonal wetland plant species are present within areas proposed for
17 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts
18 on covered and noncovered alkali seasonal wetland plants-species.
 - 19 ● *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat
20 includes the grassland matrix within which the wetlands occur, grassland restoration activities
21 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
22 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities
23 restoration would have no impacts on covered and noncovered alkali seasonal wetland
24 plants-species.
 - 25 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools
26 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,
27 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland
28 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plant
29 species. In addition, the BDCP would compensate for the loss of alkali seasonal wetlands
30 resulting from other conservation measures by restoring or creating 72 acres of alkali seasonal
31 wetlands in Conservation Zones 1, 8, or 11 to achieve no net loss of this habitat.
 - 32 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
33 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali
34 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal
35 wetland plant species.
 - 36 ● *CM22 Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland
37 plants potentially resulting from implementation of CM1 and CM4 would be avoided or
38 minimized through *AMM2 Construction Best Management Practices and Monitoring*, *AMM11*
39 *Covered Plant Species*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37*
40 *Recreation*. Under AMM11, surveys for covered plant specie species would be performed during
41 the planning phase of projects, and any impacts on populations of covered species would be
42 avoided through project design or subsequently minimized though AMM2. In addition, AMM11
43 prohibits ground disturbance or hydrologic disturbance within 250 feet of existing vernal pools,
44 which would protect those species with modeled habitat that includes vernal pool complex.

1 Occurrences of covered species in vernal pools near tidal wetlands would not be affected by
2 tidal habitat restoration where critical habitat for vernal pool species is present and would be
3 avoided under AMM11. AMM30 requires that transmission line construction avoid any losses of
4 alkali seasonal wetland complex natural community. AMM37 requires that new recreation trails
5 avoid populations of covered alkali seasonal wetland plantspecies.

6 In summary, only one known occurrence of a special-status alkali seasonal wetland species
7 (crownscale) would be affected under Alternative 4, 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 Alternative 4 on special-status alkali seasonal wetland plant species would be
12 the loss of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and
13 Delta button-celery. Approximately 72-75 acres of this habitat loss would be alkali seasonal
14 wetlands. The actual effect on modeled habitat for alkali seasonal wetland plants-species is expected
15 to be somewhat less than the estimated impact because some of this habitat is composed of vernal
16 pool complex, and the BDCP limits the total loss of wetted vernal pool habitat to 10 acres
17 (approximately 67 acres of vernal pool complex) over the permit term (AMM12). Loss of modeled
18 habitat would be compensated for by restoring or creating vernal pool complex, alkali seasonal
19 wetlands, and grasslands, in proportion to the amount of each habitat removed. At the proposed
20 restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5
21 acres of vernal pool complex restoration would be required to compensate for the loss of modeled
22 habitat composed of vernal pool complex (Objective VPNC1.2, associated with CM9). Approximately
23 72 acres of alkali seasonal wetlands would be restored (Objective ASWC1.2, associated with CM9).
24 Loss 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 plant
29 species by protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the
30 species-specific goal that 75 acres of the protected alkali seasonal wetland habitat would be
31 modeled habitat for brittlescale and heartscale (Objective BRIT/HART/SJSC1.1) and another goal
32 that would protect 2 occurrences of San Joaquin spearscale (Objective BRIT/HART/SJSC1.2). The
33 benefits of habitat protection and management also would accrue to any noncovered alkali seasonal
34 wetland plants-species occurring in the protected habitat.

35 **NEPA Effects:** Under Alternative 4, loss of modeled habitat for alkali seasonal wetland plant species
36 would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland habitat
37 (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of
38 Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,
39 these effects would not be adverse. The loss of two-one occurrences-occurrence of crownscale, a
40 non-covered species, would result in a reduction in the range and numbers of this species and would
41 be an adverse effect. Adverse effects on crownscale could be avoided or offset through
42 implementation of Mitigation Measure BIO-170.

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-species~~ would be avoided, impacts on alkali seasonal wetlands as a result of
2 implementing Alternative 4 would not result in substantially reducing the number or restricting the
3 range of five covered and two noncovered alkali seasonal wetland plant species. However,
4 conservation measures that benefit or protect covered species do not apply to noncovered species,
5 and ~~portions-loss~~ of the crownscale population at Byron Tract Forebay would ~~be lost, which would~~
6 ~~be would~~ be a significant impact. Implementation of Mitigation Measure BIO-170 would reduce this
7 impact to a less-than-significant level by conducting surveys and implementing measures to avoid,
8 minimize, or compensate for impacts to noncovered special-status plant species.

9 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
10 **Special-Status Plant Species**

11 DWR will evaluate all projects for their impacts on special-status plant species, avoid or
12 minimize impacts on species that occur on project sites, and compensate for impacts on species.
13 All impacts on federally listed noncovered species, diamond-petaled California poppy, or caper-
14 fruited tropidocarpum shall be avoided. Impacts on other special-status plant species shall be
15 avoided to the extent feasible, and any unavoidable impacts shall be compensated for.

- 16 • DWR shall conduct surveys for ~~the~~ special-status plant species within and adjacent to all
17 project sites. Special-status plant surveys required for project-specific permit compliance
18 will be conducted during the planning phase to allow design of the individual restoration
19 projects to avoid adverse modification of habitat for specified covered ~~plants-species~~. The
20 purpose of these surveys will be to verify that the locations of special-status plants-species
21 identified in previous record searches or surveys are extant, identify any new special-status
22 plant-species occurrences, and cover any portions of the project area not previously
23 surveyed. The extent of mitigation of direct loss of or indirect effects on special-status plant
24 species will be based on these survey results.
- 25 • All surveys shall be conducted by qualified biologists using the using *Guidelines for*
26 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*
27 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*
28 *Impacts to Special Status Native Plant Populations and Natural Communities* (California
29 Department of Fish and Game 2009) during the season that special-status plant species
30 would be evident and identifiable, i.e., during their blooming season. Locations of special-
31 status plant species in proposed construction areas will be recorded using a GPS unit and
32 flagged.
- 33 • The construction monitoring plan for the protection of covered fish, wildlife, and plant
34 species, prepared by DWR before implementing an approved project, will provide for
35 construction activity monitoring in areas identified during the planning stages and
36 species/habitat surveys as having noncovered special-status plant species.
- 37 • Where surveys determine that a special-status plant species is present in or adjacent to a
38 project site, direct and indirect impacts of the project on the species shall be avoided
39 through the establishment of activity exclusion zones, within which no ground-disturbing
40 activities shall take place, including construction of new facilities, construction staging, or
41 other temporary work areas. Activity exclusion zones for special-status plant species shall
42 be established around each occupied habitat site, the boundaries of which shall be clearly
43 marked with standard orange plastic construction exclusion fencing or its equivalent. The
44 establishment of activity exclusion zones shall not be required if no construction-related

1 disturbances will occur within 250 feet of the occupied habitat site. The size of activity
2 exclusion zones may be reduced through consultation with a qualified biologist and with
3 concurrence from USFWS or CDFW based on project site-specific conditions.

- 4 • Where avoidance of impacts on a special-status plant species is infeasible, DWR will
5 compensate for loss of individuals or occupied habitat of a special-status plant species
6 through the acquisition, protection, and subsequent management in perpetuity of other
7 existing occurrences at a 2:1 ratio (occurrences affected:occurrences preserved). DWR will
8 provide detailed information to USFWS and CDFW on the location of the preserved
9 occurrences, quality of the preserved habitat, feasibility of protecting and managing the
10 areas in-perpetuity, responsible parties, and other pertinent information. If suitable
11 occurrences of a special-status plant species are not available for preservation, then the
12 project shall be redesigned to remove features that would result in impacts on that species.

13 **Grassland ~~Plants~~Species**

14 One covered plant ~~species~~ and 11 noncovered special-status plant ~~species~~ occur in grasslands in the
15 study area (Tables 12-2, 12-3, summarized in Table 12-4-64). The only covered plant species
16 occurring in grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included
17 hydrological features such as stream corridors on alluvium derived from the Montezuma Formation.
18 Stream corridors (intermittent and perennial) that intersected these geologic units were selected
19 and truncated at the point at which they encountered the upper elevation of intertidal marsh. The
20 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated
21 maximum extent of alluvium deposits in close proximity to the actual rivers/streams.

22 Full implementation of Alternative 4 would include the following conservation actions over the term
23 of the BDCP to benefit covered grassland ~~plants-species~~ (~~BDCP see~~ Chapter 3, Section 3.3,
24 ~~Conservation Strategy Biological Goals and Objectives, of the Draft BDCP~~).

- 25 • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1
26 and/or 11 (Objective CGB1.1, associated with CM3).
- 27 • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse
28 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

29 Of 78,047 acres of grasslands in the study area, Alternative 4 would adversely affect ~~2,9483,449~~
30 acres under Alternative 4, including 4 acres that are modeled habitat for Carquinez goldenbush. For
31 10 of the plant ~~species~~, no known occurrences would be affected. One of five Parry's rough tarplant
32 occurrences in the study area could be adversely affected by Alternative 4. Table 12-4-64
33 summarizes the acreage of grassland habitat in the study area and the number of occurrences of
34 each special-status grassland ~~plant-species~~ in the study area.

1 **Table 12-4-64. Summary of Impacts on Grassland Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Carquinez goldenbush modeled habitat	1,346	4	=0	=0	Habitat loss from tidal habitat restoration
Grassland	78,047	2,8573.549	=0	=0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass Fisheries enhancements, floodplain restoration, and construction of conservation hatcheries
Covered Species					
Carquinez goldenbush	=0	=0	10	1	Population loss from tidal restoration
Noncovered Species					
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 ^a	=0	=0	1	0	None
Caper-fruited tropidocarpum	=0	=0	8	0	None
^a 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 Plants Species**

4 Alternative 4 could have adverse effects on modeled habitat for Carquinez goldenbush. It could also
 5 have adverse effects on one occurrence of Carquinez goldenbush and one occurrence of Parry's
 6 rough tarplant. Although Alternative 4 would have no expected effects on known occurrences of the
 7 other special-status plant species that occur in grasslands, the loss of 2,8573.449 acres of grassland
 8 would have the potential to affect undocumented populations of special-status 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~~ species are within the proposed
6 footprint for the Alternative 4 water conveyance facilities. About 580-657 acres of grassland
7 habitat would be affected by construction of the water conveyance facilities. However, this
8 grassland habitat consists of small patches of herbaceous ruderal vegetation along levees that do
9 not provide habitat for special-status grassland species. Therefore, under Alternative 4,
10 construction and operation of the water conveyance facilities would not affect the 12 special-
11 status grassland ~~plants~~ species.
- 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 Bypass
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~~ species.
- 24 • *CM3 Natural Communities Protection and Restoration*: Alternative 4 would preserve 8,000 acres
25 of grassland habitat, some of which may contain modeled habitat for Carquinez goldenbush.
26 Protection of grassland habitat may also protect undiscovered occurrences of special-status
27 plant species.
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
29 remove 1,122 acres of grassland habitat, including 4 acres of modeled habitat for Carquinez
30 goldenbush along the eastern side of Suisun Marsh. One occurrence of Carquinez goldenbush
31 would be partially affected by tidal restoration. No other known occurrences of special-status
32 grassland plants are within the hypothetical footprint of tidal restoration. Therefore, tidal
33 restoration would have impacts on only one known occurrence of special-status grassland
34 ~~plants~~ species.
- 35 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would
36 result in the loss of 85 acres of grassland habitat, periodic inundation of the floodplain would
37 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be
38 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known
39 occurrences of special-status grassland plants are present within areas proposed for floodplain
40 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that
41 does not support special-status grassland plants. Therefore, floodplain restoration and
42 construction of new floodplain levees would have no impacts on covered and noncovered
43 grassland ~~plants~~ species.
- 44 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are
45 present within areas proposed for channel margin habitat enhancement. Areas mapped as

1 grassland along levees that would be affected by channel margin habitat enhancement are small
2 patches of ruderal vegetation along levees that do not provide habitat for special-status
3 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel
4 margin habitat enhancement would have no impacts on covered and noncovered grassland
5 [plantspecies](#).

- 6 • *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or
7 known occurrences of special-status grassland plants are present within areas proposed for
8 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts
9 on covered and noncovered grassland [plantspecies](#).
- 10 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres
11 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,
12 cultivated land) or degraded grasslands. These areas do not currently provide habitat for
13 special-status grassland plants. Therefore, grassland communities restoration would have no
14 impacts on covered and noncovered grassland [plantspecies](#).
- 15 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes
16 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored
17 would consist of areas of former vernal pool complex that have been leveled for cultivation,
18 special-status grassland plants would not be present. Therefore, vernal pool complex
19 restoration would not affect special-status grassland [plantspecies](#).
- 20 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
21 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland
22 habitat and would have no impacts on covered and noncovered grassland [plantspecies](#).
- 23 • *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35
24 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation
25 that would not be likely to provide habitat for special-status grassland plants. Therefore,
26 construction of the conservation hatcheries would not be expected to affect special-status
27 grassland [plantspecies](#).
- 28 • *CM22 Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially
29 resulting from implementation of CM4 and potential effects on undiscovered populations of
30 special-status grassland plants would be avoided or minimized through *AMM11 Covered Plant*
31 *Species*, *AMM2 Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*.
32 Under AMM11, surveys for covered plant species would be performed during the planning
33 phase of projects, and any impacts on populations of covered species would be avoided through
34 project design or subsequently minimized through AMM2. AMM37 requires that new recreation
35 trails would avoid populations of Carquinez goldenbush.

36 The primary effect of Alternative 4 on special-status grassland plant [species](#) is the loss of potential
37 (i.e., modeled) habitat for Carquinez goldenbush, including part of one occurrence. Adverse effects
38 on the occurrence will be minimized through AMM11. Protecting three unprotected occurrences of
39 Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and enhancing
40 occupied habitat for Carquinez goldenbush (Objective CGB1.2, associated with CM11) would
41 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by
42 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status
43 grassland [plants-species](#) would be affected.

1 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting
2 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit
3 Carquinez goldenbush, the Plan proposes to protect at least three Carquinez goldenbush
4 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied
5 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with
6 avoidance and minimization of impacts on species occurrences, would reduce any effects of BDCP
7 implementation on covered grassland ~~plants-species~~ to a level that is no longer adverse.

8 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset
9 through CM3, CM8, and CM11. Therefore, implementation of Alternative 4 would result in no
10 adverse effects on special-status grassland plant ~~species~~.

11 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be
12 avoided or compensated for, Alternative 4 would not result in substantially reducing the numbers or
13 restricting the range of one covered or 11 noncovered special-status grassland ~~plants-species~~, and
14 this impact would be less than significant. No mitigation is required.

15 **Valley/Foothill Riparian ~~PlantsSpecies~~**

16 Two covered plants and two noncovered special-status plant ~~species~~ occur in valley/foothill
17 riparian habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-4-65). The
18 valley/foothill riparian habitat model for Delta button-celery and slough thistle was mapped as all of
19 the study area along the flood plain of the San Joaquin River between the levees from the Mossdale
20 Bridge to Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery
21 and slough thistle is unknown; all known occurrences of these species within the area of modeled
22 habitat are believed to be extirpated.

23 Full implementation of Alternative 4 would include the following conservation actions over the term
24 of the BDCP to benefit covered valley/foothill riparian plants (~~BDCP-see~~ Chapter 3, Section 3.3,
25 ~~Conservation Strategy Biological Goals and Objectives, of the Draft BDCP~~).

- 26 ● Protect and enhance two occurrences of delta button celery. If occurrences are not found in the
27 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two
28 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in
29 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3
30 and CM11).
- 31 ● Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan
32 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within
33 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in
34 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and
35 CM11).

36 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 4 would ~~adversely~~
37 affect 869 acres, including ~~15-33~~ acres that are modeled habitat for Delta button-celery and 11 acres
38 that are modeled habitat for slough thistle. Table 12-4-65 summarizes the acreage of modeled
39 habitat for Delta button-celery and slough thistle and the number of occurrences of each special-
40 status riparian ~~plant-species~~ in the study area.

1 **Table 12-4-65. Summary of Impacts on Valley/Foothill Riparian Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta button-celery modeled habitat	3,361a	1533	=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	8691,145	=0	=0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta button-celery	=0	=0	1b	1	Occurrence potentially affected by floodplain restoration
Slough thistle	=0	=0	2	2	Occurrences potentially affected by floodplain restoration
Noncovered Species					
Northern California black walnut	=0	=0	1	0	None
Wright's trichocoronis	=0	=0	1	0	None

^a A portion of this acreage consists of alkali seasonal wetland
^b A second occurrence is in alkali seasonal wetland

2

3 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants Species**

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 plant species are expected. Modeled habitat for Delta button-celery and
7 slough 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 4373 acres of valley-foothill riparian habitat under Alternative 4. However, no modeled
14 habitat and no known occurrences of the four special-status valley/foothill riparian plants
15 species are within the proposed footprint for the Alternative 4 water conveyance facilities.
16 Therefore, under Alternative 4, construction and operation of the water conveyance facilities
17 would not affect covered or noncovered special-status valley/foothill riparian plantsspecies.

- 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-species~~ are within the hypothetical footprint for construction or operation of the Yolo
5 Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass
6 Fisheries enhancements would not affect the covered or noncovered valley/foothill riparian
7 ~~plants-species~~.
- 8 • *CM3 Natural Communities Protection and Restoration*: Alternative 4 would protect 552 acres of
9 existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on
10 special-status valley/foothill plant ~~species~~ because no extant occurrences of special-status
11 valley/foothill ~~plants-species~~ are present in the study area.
- 12 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres
13 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of
14 the four special-status valley/foothill riparian ~~plants-species~~ are within the hypothetical
15 footprint for tidal restoration. Therefore, tidal restoration would not affect the covered or
16 noncovered valley/foothill riparian ~~plants-species~~.
- 17 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
18 would remove 78 acres of valley/foothill riparian habitat, including 15 acres of modeled habitat
19 for Delta button-celery along the San Joaquin River in CZ 7. In addition, floodplain restoration
20 would result in more frequent and longer inundation of 18 acres of modeled habitat for Delta
21 button-celery in this area. The area affected contains one historic occurrence of Delta button
22 celery. This occurrence is considered to be extirpated, because all habitat for Delta button-celery
23 at his location has been converted to agriculture (California Department of Fish and Wildlife
24 2013). Therefore, Alternative 4 would not have an adverse effect on Delta button celery in CZ 7.
- 25 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of
26 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.
27 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or
28 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not
29 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not
30 be compatible with restoring woody riparian habitat. In addition, establishing new populations
31 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any
32 beneficial effects on Delta button-celery would be speculative.
- 33 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough
34 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat
35 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50
36 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled
37 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences
38 of slough thistle present in the study area, only one is considered to be extirpated (California
39 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences
40 of slough thistle. If occurrences are not found in the study area, then two, self-sustaining
41 occurrences of slough thistle would be established using locally-sourced genetic material for a
42 total of two occurrences within the restored floodplain habitat on the main stem of the San
43 Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new
44 populations of slough thistle is an untried, unproven procedure and may not be feasible.
45 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 4 would not be expected to have an
8 adverse effect on Wright's trichocoronis.

- 9 • *CM6 Channel Margin Habitat Enhancement*: No modeled habitat or occurrences of special-status
10 valley/foothill riparian ~~plants-species~~ are present within areas proposed for channel margin
11 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts
12 on covered and noncovered valley/foothill riparian ~~plantsspecies~~.
- 13 • *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status
14 valley/foothill riparian ~~plants-species~~ 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 ~~plantsspecies~~.
- 17 • *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill
18 riparian ~~plants-species~~ are present within areas proposed for grassland communities
19 restoration. Therefore, grassland communities restoration would have no impacts on covered
20 and noncovered valley/foothill riparian ~~plantsspecies~~.
- 21 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-
22 status valley/foothill riparian ~~plants-species~~ are present within areas proposed for vernal pool
23 and alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration
24 would have no impacts on covered and noncovered valley/foothill riparian ~~plantsspecies~~.
- 25 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
26 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid
27 valley/foothill riparian habitat and would have no impacts on covered and noncovered
28 valley/foothill riparian ~~plantsspecies~~.
- 29 • ~~CM22~~ *Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle
30 potentially resulting from implementation of CM5 would be avoided or minimized though
31 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*
32 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the
33 planning phase of projects, and any impacts on populations of covered species would be avoided
34 through project design or subsequently minimized though AMM2.

35 Because no extant occurrences of special-status valley/foothill riparian plant ~~specie~~s are known to
36 occur in the study area, Alternative 4 is not expected to adversely affect any special-status
37 valley/foothill riparian plants. Modeled habitat for both Delta button-celery and slough thistle
38 would be affected. Under AMM11, surveys for covered plant ~~specie~~s would be performed during the
39 planning phase for floodplain restoration. If Delta button-celery or slough thistle were found to be
40 present in the floodplain restoration area, then the project would be designed to avoid impacts on
41 the populations. Therefore, Alternative 4 would not have an adverse effect on these species.

42 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of
43 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:** Implementation of the BDCP under Alternative 4 would not have an adverse effect on
4 special-status valley/foothill riparian plant species.

5 **CEQA Conclusion:** Under Alternative 4, the BDCP would not result in a reduction in the range and
6 numbers of covered and noncovered valley/foothill riparian plant species because no extant
7 occurrences of special-status valley/foothill riparian plant species are known to occur in the study
8 area and because implementation of AMMs would include surveys for covered plant species and
9 measures to avoid or minimize potential impacts through project design. This impact would be less
10 than significant. No mitigation is required.

11 **Tidal Wetland ~~Plants~~Species**

12 Seven covered plants and one noncovered special-status plant species occur in tidal wetlands in the
13 study area (Tables 12-2, 12-3, summarized in Table 12-4-66). Five tidal wetland habitat models
14 were developed for the seven covered plant species occurring in tidal wetland habitat.

15 Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3
16 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which
17 was obtained from the BDCP GIS vegetation data layer.

18 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area
19 according to the species' habitat association with woody riparian habitat. The model selected Delta
20 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to
21 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits
22 of the BDCP Valley Riparian natural community characterized by California dogwood, white alder,
23 and arroyo willow.

24 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated
25 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was
26 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal
27 perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons
28 that were limited by specific vegetation units that are known to be closely associated with soft
29 bird's-beak habitat.

30 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of
31 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was
32 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,
33 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill
34 riparian, or cultivated land habitats cover types. For brackish water areas in and near Suisun Marsh,
35 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10
36 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60
37 centimeters) above intertidal.

38 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish
39 emergent wetland polygons with the appropriate vegetation. This included vegetation units
40 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

1 Full implementation of Alternative 4 would include the following conservation actions over the term
2 of the BDCP to benefit covered tidal wetland ~~plants-species~~ (BDCP-see Chapter 3, Section 3.3,
3 ~~Conservation Strategy Biological Goals and Objectives, of the Draft BDCP~~).

- 4 • No net loss of Mason's lilaopsis and delta mudwort occurrences within restoration sites, or
5 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated
6 with CM4 and CM11).
- 7 • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites
8 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 9 • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded
10 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 11 • Complete seed banking of all existing Suisun Marsh populations and the representative genetic
12 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 13 • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection
14 protocols (Objective SBB/SuT1.3, associated with CM11).
- 15 • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,
16 associated with CM11).

17 Of 17,357 acres of tidal wetlands in the study area, Alternative 4 would affect 25 acres, including
18 areas that are modeled habitat for Mason's lilaopsis, Delta mudwort, side-flowering skullcap, Delta
19 tule pea, Suisun Marsh aster, soft bird's-beak, and Suisun thistle. Known occurrences of all of these
20 species would be affected. In addition, three occurrences of Bolander's water-hemlock, a noncovered
21 special-status ~~plantspecies~~, could be affected by tidal habitat restoration. Table 12-4-66 summarizes
22 the acreage of modeled habitat for covered tidal wetland species and the number of occurrences of
23 each special-status tidal wetland ~~plants-species~~ in the study area.

1 **Table 12-4-66. Summary of Impacts on Tidal Wetland Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta mudwort/ Mason's lilaepsis modeled habitat	6,081	4365	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	1320	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
Tidal brackish emergent wetland	8,501	10	0	0	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	2429	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta mudwort	0	0	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	0	0	106	2826	Occurrences affected by tidal habitat restoration
Mason's lilaepsis	0	0	181	2223	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	0	0	12	21	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	29	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle	0	0	4	0	None
Noncovered Species					
Bolander's water hemlock	0	0	8	3	Occurrences affected by tidal habitat restoration

2

1 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants Species**

2 Alternative 4 would have adverse effects on tidal marsh special-status plant species through
3 implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation
4 of CM3, or CM6–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
- 9 • *CM1 Water Facilities and Operations:* Construction of the Alternative 4 water conveyance
10 facilities would remove ~~34-39~~ acres of modeled habitat for delta mudwort and Mason’s
11 lilaopsis, ~~49~~ acres of modeled habitat for side-flowering skullcap, and 2 acres of modeled
12 habitat for Delta tulle pea and Suisun Marsh aster. The extent to which modeled habitat is
13 actually occupied by these species is not known; however, ~~two occurrences of Delta tulle pea,~~
14 ~~seven~~~~eight~~ occurrences of Mason’s lilaopsis, three occurrences of Suisun Marsh aster, and ~~two~~
15 ~~occurrences~~~~one occurrence~~ of side-flowering skullcap in the study area could be affected by
16 construction impacts. No known occurrences of the other covered and noncovered tidal wetland
species would be affected by construction of the water conveyance facilities.
 - 17 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries
18 enhancements would remove 5 acres of modeled habitat for Mason’s lilaopsis and delta
19 mudwort. The extent to which modeled habitat is actually occupied by these species is not
20 known; however, no known occurrences in the study area would be affected. Yolo Bypass
21 operations would result in more frequent and longer inundation of 8 acres of modeled habitat
22 Delta tulle peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster could be affected
23 by Yolo Bypass operations. Habitat for these species is normally periodically inundated or
24 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the
25 habitat would not be expected to have a substantial effect.
 - 26 • *CM3 Natural Communities Protection and Restoration:* The BDCP proposes restoring or creating
27 20 linear miles of transitional tidal areas within other natural communities that would be
28 created or restored, including 3,000 acres of tidal brackish emergent wetland and 13,900 acres
29 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these
30 areas would be maintained and enhanced. The BDCP does not specifically propose to protect
31 any occurrences of covered tidal wetland ~~plants-species~~ nor does it propose active restoration of
32 affected habitat or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored
33 transitional tidal areas will be passively colonized by the covered tidal wetland ~~plants~~species.
 - 34 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration would permanently
35 remove 6 acres of modeled habitat for Mason’s lilaopsis and Delta mudwort. Habitat loss would
36 occur through conversion of the species habitat (at and immediately above the tidal zone in
37 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled
38 habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences
39 of Mason’s lilaopsis and three of 58 known occurrences of delta mudwort in the study area
40 could be affected by tidal habitat restoration.
- 41 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.
42 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not
43 known; however, none of the 12 known occurrences in the study area would be affected.

1 Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tule pea and Suisun
2 Marsh aster. Habitat loss would result from conversion of the species habitat (at and
3 immediately above the tidal zone in marshes and along rivers and streams) to inundated tidal
4 habitat. However, the BDCP would allow up to 50 acres of modeled habitat to be converted to
5 inundated tidal habitat. The extent to which modeled habitat is actually occupied by the species
6 is not known; however, 26 of 112 known occurrences of Delta tule pea and 23 of 145
7 occurrences of Suisun Marsh aster in the study area could be affected.

8 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun
9 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually
10 occupied by the species is not known; however, seven of 13 known occurrences of soft bird's-
11 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in
12 the study area would be affected.

13 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-
14 hemlock, a noncovered special-status species in the study area. Because Bolander's water-
15 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site
16 preparation, earthwork, and other site activities could adversely affect Bolander's water-
17 hemlock through direct habitat removal.

- 18 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
19 would remove 3 acres of modeled habitat for Mason's lilaepsis and delta mudwort and 2 acres
20 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the
21 study area would be affected by floodplain restoration.

22 Floodplain restoration would result in more frequent and longer inundation of 212 acres of
23 modeled habitat for Mason's lilaepsis and delta mudwort, 18.6 acres of modeled habitat for
24 side-flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh
25 aster. No known occurrences of these species in the study area would be affected by periodic
26 inundation of restored floodplain habitat. Habitat for these species is normally periodically
27 inundated or saturated; therefore, a small increase in the frequency and duration of periodic
28 inundation of the habitat would not be expected to have a substantial effect.

- 29 • *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed
30 separately from the effects of tidal habitat restoration. Channel margin enhancement would
31 have adverse effects on tidal wetland plants through direct removal and habitat modification.
32 However, it would have beneficial effects on these species by improving the habitat functions for
33 these species as a result of riprap removal and creation of floodplain benches. Side-flowering
34 skullcap would benefit from installation of large woody material, which it appears to colonize.
- 35 • *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to
36 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat
37 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out
38 for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 39 • *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-
40 status tidal wetland plants are present within areas proposed for grassland communities
41 restoration. Therefore, grassland communities restoration would have no impacts on covered
42 and noncovered tidal wetland plantspecies.
- 43 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or
44 occurrences of special-status tidal wetland plantspecies are present within areas proposed for

1 vernal pool complex restoration. Therefore, vernal pool complex restoration would have no
2 impacts on covered and noncovered tidal wetland ~~plants~~species.

- 3 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
4 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland
5 habitat and would have no impacts on covered and noncovered tidal wetland ~~plants~~species.
- 6 • *CM22 Avoidance and Minimization Measures*: Effects on covered tidal wetland plant ~~species~~
7 potentially resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or
8 minimized though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices*
9 *and Monitoring*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37*
10 *Recreation*. Under AMM11, surveys for covered plant species would be performed during the
11 planning phase of projects, and any impacts on populations of covered species would be avoided
12 through project design or subsequently minimized through AMM2. In addition, AMM11 contains
13 specific guidance to avoid adverse modification of any of the primary constituent elements for
14 Suisun thistle or soft bird's-beak critical habitat. AMM30, which specifies that the alignment of
15 proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats
16 when siting poles and towers, to the maximum extent feasible, would avoid some impacts on
17 Mason's lilaeopsis and side-flowering skullcap. AMM37 requires that new recreation trails avoid
18 populations of covered tidal wetland ~~plants~~species.

19 In summary, the GIS analysis indicates that Alternative 4 would result in the loss of modeled habitat
20 for all of the covered species and result in adverse effects on known occurrences of all of the special-
21 status ~~plants~~species occurring in tidal wetlands. However, the BDCP predicts that habitat
22 restoration activities would greatly expand the amount of habitat available to each of these species,
23 offsetting any potential loss of habitat or occurrences resulting from covered activities.

24 Delta mudwort could lose ~~4365~~ acres of modeled habitat (~~0.71.1~~%), including all or part of three
25 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
26 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
27 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement
28 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
29 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also
30 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
31 predicts that natural expansion of populations into the restored habitat would take place and result
32 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
33 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
34 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

35 Mason's lilaeopsis could lose ~~43-65~~ acres of modeled habitat (~~0.71.1~~%), including all or part of ~~2223~~
36 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
37 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
38 colonization by Mason's lilaeopsis, which could offset this habitat loss. Channel margin enhancement
39 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
40 creating habitat for Mason's lilaeopsis; creation of suitable habitat under these measures could also
41 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
42 predicts that natural expansion of populations into the restored habitat would take place and result
43 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
44 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
45 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

1 Delta tule pea could lose 5 acres of modeled habitat (0.08%), including all or part of ~~28-26~~
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 Delta tule pea, which could offset this habitat loss. Channel margin enhancement
5 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
6 creating habitat for Delta tule pea; creation of suitable habitat under these measures could also help
7 offset this habitat loss. Although active restoration of this species is not proposed, the BDCP predicts
8 that natural expansion of populations into the restored habitat would take place and result in no net
9 loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-implementation
10 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
11 no net loss of occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

12 Suisun Marsh aster could lose 5 acres of modeled habitat (0.08%), including all or part of 29
13 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
14 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
15 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin
16 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the
17 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these
18 measures could also help offset this habitat loss. Although active restoration of this species is not
19 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would
20 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-
21 implementation monitoring of affected occurrences and occurrences in reserve lands would be done
22 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,
23 associated with CM11).

24 All four of these species (Delta mudwort, Mason's lilaeopsis, Delta tule pea, and Suisun Marsh aster)
25 are widespread in the study area with many occurrences. Habitat modification and loss are the
26 primary stressors that are responsible for their decline and that currently limit their distribution
27 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these
28 species would provide a reasonable expectation that the distribution and abundance of these
29 species would also improve. Because a relatively small amount of modeled habitat would be
30 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered
31 activities on these species would be offset and that the overall effect of Alternative 4 on these
32 species would not be adverse.

33 Side-flowering skullcap could lose ~~13-20~~ acres of modeled habitat (~~0.50.8~~%), including all or part of
34 ~~two occurrences~~ one occurrence. One occurrence would be avoided through implementation of
35 AMM30. The location of a second potentially affected occurrence, which was last observed in 1892,
36 is not known precisely. Under AMM11, this occurrence would be surveyed for, and because this is a
37 tidal freshwater wetland species, avoidance of the habitat during project construction would be
38 highly likely. 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 side-flowering skullcap, which could offset this habitat loss. Channel margin
41 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the
42 potential for creating habitat for side-flowering skullcap; creation of suitable habitat under these
43 measures could also help offset this habitat loss. No active restoration of this species is proposed,
44 and no post-implementation monitoring of affected occurrences and occurrences in reserve lands
45 would be done. Because impacts on occurrences of side-flowering skullcap would be avoided, and

1 because loss of modeled habitat for the species would be offset through restoration, the overall
2 effect of Alternative 4 on this species would not be adverse.

3 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven
4 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
5 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
6 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill
7 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak
8 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
9 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.
10 Although no active restoration of this species is proposed, post-implementation monitoring of soft
11 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that
12 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft
13 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and
14 habitat modification is the primary factor responsible for the species' decline and limiting the
15 species' distribution and abundance. Improving habitat functions for this species would provide a
16 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.
17 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft
18 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.
19 Therefore, it is likely that the overall effect of Alternative 4 on this species would not be adverse.

20 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be
21 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
22 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
23 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological
24 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle
25 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
26 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In
27 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective
28 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences
29 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or
30 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement
31 of habitat functions, and establishment of new occurrences would offset any potential loss of
32 modeled habitat for Suisun Marsh thistle.

33 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential
34 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun
35 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives
36 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by
37 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered
38 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable
39 expectation that habitat restoration without active species-specific restoration activities would
40 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-
41 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to
42 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative
43 4 on Bolander's water hemlock could be adverse.

44 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants
45 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative 4

would result in no adverse effects on seven of eight special-status ~~grassland-tidal habitat~~ ~~species~~plants in the study area. Alternative 4 would result in a reduction in the range and numbers of Bolander’s water-hemlock, which would be an adverse effect. Adverse effects on Bolander’s water-hemlock could be avoided or offset through implementation of Mitigation Measure BIO-170.

CEQA Conclusion: Because loss of occurrences and modeled habitat for covered tidal habitat plant species would be offset through habitat restoration, impacts on covered tidal wetland plants as a result of implementing Alternative 4 would not be significant. However, the loss of Bolander’s water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would reduce this impact to a less-than-significant level by conducting surveys and implementing measures to avoid, minimize, or compensate for impacts to noncovered special-status plant species.

Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant Species

Please see Mitigation Measure BIO-170 under Impact BIO-170.

Inland Dune ~~Plants~~Species

Five special-status plant ~~species~~ occur in inland dune habitat in the study area. None of the species is covered under the BDCP, and no habitat models were prepared for inland dune habitat. Table 12-4-67 summarizes the acreage of inland dune habitat in the study area and the number of occurrences ~~of for~~ each special-status inland dune ~~plant~~species in the study area.

Table 12-4-67. Summary of Impacts on Inland Dune Plants under Alternative 4

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Inland Dunes	19	0	=0	=0	None
Noncovered Species					
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

Impact BIO-174: Effects on Habitat and Populations of Inland Dune ~~Plants~~Species

Alternative 4 would have no adverse effects on inland dune ~~plants~~species (Table 12-4-67). No construction activities or habitat restoration would take place where the species occur. No specific actions to benefit inland dune species are proposed.

NEPA Effects: Implementation of the BDCP under Alternative 4 would not affect special-status inland dune species.

CEQA Conclusion: Because the BDCP would not affect inland dune habitat, implementation of Alternative 4 would have no ~~significant~~ impacts on inland dune species. No mitigation is required.

1 **Nontidal Wetland ~~Plants~~Species**
 2 No covered plant species occur in nontidal wetlands in the study area; however, six noncovered
 3 special-status plant species occur in nontidal wetlands in the study area. Table 12-4-68 summarizes
 4 the acreage of nontidal wetland habitat in the study area and the number of occurrences of each
 5 special-status nontidal wetland ~~plant~~species in the study area.

6 **Table 12-4-68. Summary of Impacts on Nontidal Wetland Plant ~~Species~~ under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Nontidal freshwater aquatic	5,489 5.5 67	333 362	==0	==0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,385 1.5 09	133 142	==0	==0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass Fisheries enhancements, and floodplain restoration
Noncovered Species					
Watershield	==0	==0	3	1	Loss of habitat from construction of water conveyance facilities
Bristly sedge	==0	==0	18	23	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow ^a	==0	==0	121	13 15	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	32	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Marsh skullcap ^a	==0	==0	1	0	None

^a Also occurs in valley/foothill riparian habitat.

7
 8 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants ~~Species~~**

9 Under Alternative 4, known occurrences watershield, bristly sedge, woolly rose-mallow, and
 10 Sanford's arrowhead would be within the proposed footprint for the water conveyance facilities or
 11 within the hypothetical footprint for restoration activities and would be adversely affected.
 12 Alternative 4 would have no adverse effects on eel-grass pondweed or marsh skullcap.

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*: Construction of the Alternative 4 water conveyance
5 facilities would adversely affect four noncovered special-status plant species occurring in
6 nontidal wetlands. One of three watershed occurrences in CZ 5 on Bouldin Island could be
7 affected by construction of the water conveyance facilities. This is a historical occurrence that
8 has not been observed since 1893, and it may be extirpated (California Department of Fish and
9 Wildlife 2013). ~~Two-Three~~ occurrences of bristly sedge in CZ 4 and CZ 5, including
10 approximately 1.54 acres of occupied habitat, would be affected by construction of the water
11 conveyance facilities. ~~Thirteen-Fifteen~~ occurrences of woolly rose-mallow would be affected. Six
12 occurrences in CZ 4 ~~would-could~~ be removed during construction of the intake facilities and
13 disposal of reusable tunnel material, and ~~five-four~~ occurrences in CZ 6 and ~~one-occurrence~~
14 ~~four~~ occurrences in CZ 8 would be affected by construction of other facilities and by geotechnical
15 investigations. Construction of the water conveyance facilities would remove occupied habitat at
16 ~~two-occurrences~~ one occurrence of Sanford's arrowhead in CZ 4. Under Alternative 4,
17 construction and operation of the water conveyance facilities could affect 77 acres of nontidal
18 wetlands, which could have adverse effects on undiscovered occurrences of the six non-covered
19 special-status nontidal wetland plant species.
- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal
21 wetland plants are present in the hypothetical footprint for construction or operation of the
22 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass
23 Fisheries enhancements would not affect special-status nontidal marsh plantsspecies.
- 24 • *CM3 Natural Communities Protection and Restoration*: No specific natural communities
25 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of
26 special-status nontidal plantsspecies are proposed for protection.
- 27 • *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead is
28 present within areas that could be affected by tidal habitat restoration in CZ 2. One known
29 occurrence of woolly rose-mallow is present within areas that could be affected by tidal habitat
30 restoration in CZ 7. No other known occurrences of special-status nontidal wetland plants
31 species are present within areas proposed for tidal habitat restoration. Therefore, tidal habitat
32 restoration could have adverse effects on two special-status nontidal wetland plantsspecies.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status
34 nontidal wetland plantsspecies are present within areas proposed for floodplain restoration.
35 Therefore, floodplain restoration and construction of new floodplain levees would have no
36 impacts on special-status nontidal wetland plantsspecies.
- 37 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland
38 plantsspecies are present within areas proposed for channel margin habitat enhancement.
39 Therefore, channel margin habitat enhancement would have no impacts on known occurrences
40 of special-status nontidal wetland plantsspecies.
- 41 • *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal
42 wetland plantsspecies are present within areas proposed for riparian habitat restoration.
43 Therefore, riparian habitat restoration would have no impacts on known occurrences of special-
44 status nontidal wetland plantsspecies.

- 1 • *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal
2 wetland plants-species are present within areas proposed for grassland communities
3 restoration. Therefore, grassland communities restoration would have no impacts on special-
4 status nontidal wetland plantsspecies.
- 5 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of
6 special-status nontidal wetland plants-species are present within areas proposed for vernal pool
7 complex restoration. Therefore, vernal pool complex restoration would have no impacts on
8 special-status nontidal wetland plantsspecies.
- 9 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
10 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing
11 nontidal marsh and would have no adverse effects on special-status nontidal wetland
12 plantsspecies. The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal
13 freshwater marsh, including components of nontidal perennial aquatic and nontidal freshwater
14 perennial emergent wetland communities, and by maintaining and enhancing the habitat
15 functions of protected and created nontidal wetland habitats for covered and other native
16 species. However, no specific actions to benefit noncovered species are proposed.

17 Under Alternative 4, 1,500 acres of nontidal marsh would be restored (Objective NFEW/NPANC1.1,
18 addressed under CM10). However, these wetlands would be restored primarily as habitat for giant
19 garter snake. These habitat restoration activities would be unlikely to expand the amount of habitat
20 available to watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead, potential loss
21 of habitat or occurrences resulting from covered activities would not be compensated for. Moreover,
22 because special-status nontidal wetland plant species are not covered under the BDCP, the species
23 protections afforded to covered species under CM22-the AMMs do not apply to these species, and
24 the effects of Alternative 4 on these species would be adverse. Implementation of Mitigation
25 Measure BIO-170, *Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant*
26 *Species*, would reduce these effects.

27 **NEPA Effects:** Implementation of the BDCP under Alternative 4 could result in a reduction in the
28 range and numbers of watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead, four
29 noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on these
30 species could be avoided or offset through implementation of Mitigation Measure BIO-170.

31 **CEQA Conclusion:** Under Alternative 4, construction of the water conveyance facilities could result
32 in a reduction in the range and numbers of watershield, bristly sedge, woolly rose-mallow, and
33 Sanford's arrowhead. Tidal habitat restoration could result in a reduction in the range and numbers
34 of woolly rose-mallow and Sanford's arrowhead. These impacts would be significant.
35 Implementation of Mitigation Measure BIO-170, which requires avoidance, minimization and
36 compensation actions for impacts to noncovered species, would reduce these impacts to a less-than-
37 significant level.

38 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
39 **Special-Status Plant Species**

40 Please see Mitigation Measure BIO-170 under Impact BIO-170.

1 General Terrestrial Biology

2 Wetlands and Other Waters of the United States

3 Alternative 4 actions would both permanently and temporarily remove or convert wetlands and
4 open water that ~~are is potentially jurisdictional as~~ regulated by USACE under Section 404 of the
5 CWA. The 404 regulations and relevant information on mitigation the effects of impact to wetlands
6 and waters of the United States (U.S.) are described in Section 12.2.1.1 in Appendix A, Draft EIR/EIS
7 In-Text Chapter Revisions, of this RDEIR/SDEIS. The following two impacts address the project-level
8 effects of CM1 on these potential wetlands and waters, and the programmatic-level effects of other
9 relevant conservation actions (CM2–CM10). CM11–~~CM22~~ CM21 would not directly result in loss or
10 conversion of wetlands or other waters of the ~~United States.~~ The U.S. The methods used to conduct
11 these analyses are described in Section 12.3.2.4 in Appendix A, Draft EIR/EIS In-Text Chapter
12 Revisions, of this RDEIR/SDEIS, of this chapter. The waters of the U.S. data used for this analysis is
13 based on a verified wetland delineation from the USACE that was completed in early 2015. These
14 waters of the U.S. were mapped at finer scale than that which was done for the natural community
15 mapping for the BDCP and therefor the acreages of these two datasets differ when compared to each
16 other. The waters of the U.S. mapping identified numerous agricultural ditches and seasonal
17 wetlands occurring within and associated with cultivated lands, which explains the majority of the
18 difference.

19 Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and 20 Other Waters of the United States

21 Alternative 4 proposes the construction, maintenance, and operation of water conveyance facilities
22 within, or requiring the unavoidable fill of, waters of the U.S. The estimated fill of jurisdictional
23 waters associated with this alternative is described in Table 12-4-69 below. Construction of the
24 Alternative 4 water conveyance facilities would both temporarily and permanently remove potential
25 wetlands and other waters of the United States as regulated by Section 404 of the CWA (Table 12-4-
26 69). Based on the methodology used to conduct this analysis, the losses would occur at intake,
27 tunnel, pipeline, canal, and RTM and borrow/spoil storage sites, transmission corridors, and
28 multiple temporary work areas associated with the construction activity. The permanent wetland or
29 other waters of the United States loss ~~(244–389 acres)~~ would occur at various locations along the
30 modified pipeline/tunnel alignment. The majority of the loss would occur due to the expansion of
31 Clifton Court Forebay, new transmission lines, construction of Alternative 4's three intake structures
32 along the eastern bank of the Sacramento River between Clarksburg and Courtland in the north
33 Delta, and at the RTM storage sites associated with tunnel construction at various locations,
34 including ~~at Scribner's Bend,~~ sites between Lambert Road and Twin Cities Road, on ~~Staten and~~
35 ~~Bouldin Islands,~~ and on Byron Tract, adjacent to Clifton Court Forebay. ~~Effects for two~~
36 ~~configurations of the RTM storage sites were calculated. One configuration uses 6-foot-high piles~~
37 ~~and one configuration uses 10-foot-high piles (see Chapter 3, Section 3.6.1.2).~~ Therefore, a range of
38 acreages is shown for permanent effects in Table 12-4-69. ~~The permanent effect assuming the use of~~
39 ~~10-foot high RTM storage sites would be 244 acres; assuming 6-foot high sites, the permanent effect~~
40 ~~would be 389 acres.~~ Through implementation of an environmental commitment to reuse RTM or
41 dispose of it at appropriate facilities, as described in Appendix 3B, Environmental Commitments of
42 the Draft EIR/EIS, it is anticipated that the material would be removed from these areas and applied,
43 as appropriate, as bulking material for levee maintenance or as fill material for habitat restoration
44 projects, or would be put to other beneficial means of reuse identified for the material.

1 The temporary effects on wetlands and waters of the United States (~~94 acres~~) would also occur
 2 mainly at the three intake construction sites along the eastern bank of the Sacramento River, and at
 3 barge unloading facilities in the San Joaquin River, Snodgrass Slough, Potato Slough, Connection
 4 Slough, Old River, and West Canal and ~~Middle Rivers~~. An additional temporary effect would result
 5 from dredging of ~~2,026 acres of~~ Clifton Court Forebay.

6 **Table 12-4-69. Estimated Fill of Waters of the U.S. Associated with the Construction of Water**
 7 **Conveyance Facilities under Alternative 4 (acres)**

Habitat Type	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact ^b	Total Impact ^c
<u>Agricultural Ditch</u>	<u>45.5</u>	<u>17.4</u>	<u>0</u>	<u>62.9</u>
<u>Alkaline Wetland</u>	<u>20.3</u>	<u>0.1</u>	<u>0</u>	<u>20.4</u>
<u>Clifton Court Forebay</u>	<u>258.0</u>	<u>0</u>	<u>1,931.0</u>	<u>258.0</u>
<u>Conveyance Channel</u>	<u>8.0</u>	<u>2.9</u>	<u>0</u>	<u>10.8</u>
<u>Depression</u>	<u>29.3</u>	<u>7.1</u>	<u>0</u>	<u>36.4</u>
<u>Emergent Wetland</u>	<u>57.2</u>	<u>31.5</u>	<u>0</u>	<u>88.8</u>
<u>Forest</u>	<u>8.3</u>	<u>8.6</u>	<u>0</u>	<u>16.9</u>
<u>Lake</u>	<u>23.2</u>	<u>0</u>	<u>0</u>	<u>23.2</u>
<u>Scrub-Shrub</u>	<u>12.8</u>	<u>5.4</u>	<u>0</u>	<u>18.1</u>
<u>Seasonal Wetland</u>	<u>114.6</u>	<u>25.1</u>	<u>0</u>	<u>139.7</u>
<u>Tidal Channel</u>	<u>19.2</u>	<u>80.7</u>	<u>0</u>	<u>99.9</u>
<u>Vernal Pool</u>	<u>0.3</u>	<u>0</u>	<u>0</u>	<u>0.3</u>
Total	597	179	1,931	775

- ^a Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.
- ^b Temporary impacts are due to dredging Clifton Court Forebay
- ^c Total does not include temporary impacts to Clifton Court Forebay because these would just be temporary disturbance to open water, which typically do not require compensatory mitigation.

8 **Potential Wetlands and Other Waters of the United States Filled by Construction of Alternative 4**
 9 **Water Conveyance Facilities**

Wetland/Other Water Type ^a	Permanent ^b	Temporary	Total
Open Water			
Nontidal Flow	46-72	15	61-87
Muted Tidal Flow	1	0	1
Tidal Flow	13	46	59
Pond or Lake (nontidal)	0-54	2	2-56
Clifton Court Forebay	162	8	170
Wetland			
Nontidal Wetland	13-36	15	28-51
Tidal Wetland	3-4	7	10-11
Seasonal Wetland	6-47	1	7-48
Total Impact Acres	244-389	94	338-484

- ^a Wetland types are described in the methods section of this chapter (Section 12.2.3.4).
- ^b A range of values is shown where effects include fill from construction of 10-foot and 6-foot high RTM storage sites, respectively, as described in Chapter 3, Section 3.6.1.2, Conveyance Facilities.
 Source: California Department of Water Resources 2013b

10

1 The majority of the impacts on wetlands and waters of U.S. are to wetlands found within cultivated
2 lands (mostly agricultural ditches and seasonal wetlands) and waters associated with Clifton Court
3 Forebay. The impacted seasonal wetlands mapped within the Conveyance Planning Area, as
4 described in Section 12.3.2.4 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this
5 RDEIR/SDEIS, all occur in the central Delta within plowed agricultural fields and would be mostly
6 affected by the RTM storage sites and transmission line construction. The effects toon Clifton Court
7 Forebay arewould primarily result from the establishment of new embankments around and across
8 the existing forebay. The forebay willwould be expanded to the south by an additional 450 acres of
9 storage space resulting in a net gain of open water in the forebay.

10 Unavoidable impacts toon waters of the United States willwould be offset such that the loss of
11 acreage and functions due to construction activities are fully compensated. Wetland functions are
12 defined as a process or series of processes that take place within a wetland. These include the
13 storage of water, transformation of nutrients, growth of living matter, and diversity of wetland
14 plants, and they have value for the wetland itself, for surrounding ecosystems, and for people.
15 Functions can be grouped broadly as habitat, hydrologic/hydraulic, or water quality. Not all
16 wetlands perform all functions nor do they perform all functions equally well. The location and size
17 of a wetland may determine what functions it will perform. For example, the geographic location
18 may determine its habitat functions, and the location of a wetland within a watershed may
19 determine its hydrologic/hydraulic or water-quality functions. Many factors determine how well a
20 wetland will perform these functions: climatic conditions, quantity and quality of water entering the
21 wetland, and disturbances or alteration within the wetland or the surrounding ecosystem. Wetland
22 disturbances may be the result of natural conditions, such as an extended drought, or human
23 activities, such as land clearing, dredging, or the introduction of nonnative species. Wetlands are
24 among the most productive habitats in the world, providing food, water, and shelter for fish,
25 shellfish, birds, and mammals, and serving as a breeding ground and nursery for numerous species.
26 Many endangered plant and animal species are dependent on wetland habitats for their survival.
27 Hydrologic and hydraulic functions are those related to the quantity of water that enters, is stored
28 in, or leaves a wetland. These functions include such factors as the reduction of flow velocity, the
29 role of wetlands as ground-water recharge or discharge areas, and the influence of wetlands on
30 atmospheric processes. Water-quality functions include the trapping of sediment, pollution control,
31 and the biochemical processes that take place as water enters, is stored in, or leaves a wetland.

32 The functions of the waters of the U.S. that will be temporarily or permanently impacted by this
33 alternative vary greatly depending primarily on existing land uses and historical levels of
34 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
35 maintained and often devoid of vegetation, support only minimal hydraulic function (water
36 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
37 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
38 quality functions (e.g. reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
39 channels affected by this alternative support functions in all three categories, but the level at which
40 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
41 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
42 disturbance due to past land uses. Although these features likely support habitat, water quality, and
43 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
44 depending on the overall ecological setting and level of disturbance. Functions associated with
45 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
46 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a

1 waterway, these features are expected to function at a high level. However, where these habitats
2 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
3 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
4 such, their habitat functions have been greatly compromised, but they retain some water quality and
5 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
6 areas; however the depressions may support wetland vegetation at their edges. The areas mapped
7 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
8 relatively small, each lake is likely performing functions from all three categories.

9 A functional assessment of wetlands proposed for fill will be conducted during the development of
10 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
11 assessment will be compared to the expected functions at the proposed mitigation site(s) such that
12 it can be confirmed that the compensatory mitigation will in fact accomplish full functional
13 replacement of impacted wetlands. All impacted wetlands will be replaced with fully functional
14 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
15 hydrologic/hydraulic function. Since many impacted wetlands will be significantly less than high
16 function, the compensatory mitigation will result in a net increase in wetland function.

17 Alternative 4 was designed to avoid waters of the U.S. to the maximum extent practicable. Each of
18 the conveyance components has been located in upland areas where it was feasible to do so. Once
19 construction begins, specific measures will be implemented, as described in the AMMs set out in
20 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP and in Appendix D,
21 Substantive BDCP Revisions, of this RDEIR/SDEIS (AMM6), to further avoid and minimize effects to
22 waters of the U.S. as well as to special-status species. The AMMs will be implemented at all phases of
23 a project, from siting through design, construction, and on to operations and maintenance. The
24 AMMs that pertain specifically to waters of the U.S. are 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, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural
29 Communities, AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and Alignment
30 Guidelines, AMM34 Construction Site Security, and AMM36 Notification of Activities in Waterways.

31 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
32 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
33 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, will also
34 result in further avoidance and minimization of effects to waters of the United States.

35 Aside from wetland habitats that would be created as a result of implementing CMs 4-10, some of
36 which could serve the dual purpose of offsetting effects to species and mitigating impacts on
37 waters of the U.S., more specific mitigation is required to ensure that there is no net loss of
38 wetland functions and values as a result of implementing Alternative 4 pursuant to USACE's and
39 U.S. EPA's Mitigation Rule (see Section 12.2.1.1 in Appendix A, Draft EIR/EIS In-Text Chapter
40 Revisions of this RDEIR/SDEIS). Mitigation Measure BIO-176, Compensatory Mitigation for Fill of
41 Waters of the U.S. would be available to address adverse impacts on waters of the U.S.

42 **NEPA Effects:** The permanent and temporary loss of these ~~potential~~ jurisdictional wetlands and
43 waters of the U.S. as a result of constructing Alternative 4 water conveyance facilities would be a
44 substantial effect if not compensated by wetland protection and/or restoration. This loss would

1 represent a removal of federally protected wetlands as defined by Section 404 of the CWA. ~~However, Alternative 4 includes conservation measures (CM4 and CM10) that would restore and protect large~~
2 ~~acreages of both tidal and nontidal wetlands and open water in the study area. Through the course~~
3 ~~of the BDCP restoration program, this alternative would restore 65,000 acres of tidal and 1,200~~
4 ~~acres of nontidal wetland or open water. Impacts on wetlands from CM1 construction would occur~~
5 ~~in the first 10 years after BDCP approval. The Plan under Alternative 4 would implement AMMs 1-7,~~
6 ~~10, 12, 30, 34, and 36, which would avoid and minimize fill of wetlands and waters and any indirect~~
7 ~~effects to wetlands and waters. Approximately 19,550 acres of this wetland restoration would occur~~
8 ~~during this time period, thereby offsetting the impacts of CM1 construction. However, specific~~
9 ~~mitigation would be required to ensure that Alternative 4 does not result in a loss of functions and~~
10 ~~values of waters of the U.S. and thus that the affect is not adverse. Mitigation Measure BIO-176,~~
11 ~~Compensatory Mitigation for Fill of Waters of the U.S., would be available to reduce these effects such~~
12 ~~that they are not adverse. These acreages greatly exceed the no net loss (1:1 replacement ratio)~~
13 ~~requirement for Alternative 4 with either 10-foot-high RTM storage sites (338 acres) or 6-foot-high~~
14 ~~sites (484 acres). Therefore, there would be an overall beneficial effect on potential jurisdictional~~
15 ~~wetlands and other waters of the United States from Alternative 4 implementation.~~

17 **CEQA Conclusion:** ~~The permanent and temporary loss of these jurisdictional wetlands and waters of~~
18 ~~the U.S. as a result of constructing Alternative 4 water conveyance facilities would be a significant~~
19 ~~impact. Specific mitigation would be required to ensure that Alternative 4 does not result in a loss of~~
20 ~~functions and values of waters of the U.S. Mitigation Measure BIO-176, Compensatory Mitigation for~~
21 ~~Fill of Waters of the U.S., would be available to reduce the impact to a less-than-significant level.~~
22 ~~Alternative 4 does propose to restore up to 76,721 acres of wetland natural communities under the~~
23 ~~Plan, which would include 65,000 acres of tidal marsh restoration (CM4), 10,000 acres of seasonally~~
24 ~~inundated floodplain restoration (CM5), 21 acres of vernal pool/alkali seasonal wetlands (CM9; 67~~
25 ~~acres of vernal pool complex and 72 acres of alkali seasonal wetland complex assuming a wetland~~
26 ~~density of 15%), and 1,700 acres of nontidal marsh restoration (CM10). In addition, Alternative 4~~
27 ~~would restore 5,000 acres of riparian habitat (CM7), some portion of which may also qualify as~~
28 ~~forested or scrub-shrub wetland. In addition, 20 miles of levees will have channel margin~~
29 ~~enhancement conducted on them (CM6), which would include improving channel geometry and~~
30 ~~restoring riparian, marsh, and mudflat habitats on the water side of levees.~~

31 ~~The success in implementing these Conservation Measures would be assured through effectiveness~~
32 ~~monitoring, which includes success criteria, and adaptive management as outlined in the Adaptive~~
33 ~~Management and Monitoring sections of the Draft BDCP for tidal marsh restoration (Draft BDCP~~
34 ~~Section 3.4.4.4), seasonal floodplain restoration (Draft BDCP Section 3.4.5.4), channel margin~~
35 ~~enhancement (Draft BDCP Section 3.4.6.4), valley/foothill riparian restoration (Draft BDCP Section~~
36 ~~3.4.7.4), vernal pool and alkali seasonal wetland complex restoration (Draft BDCP Section 3.4.9.4),~~
37 ~~and nontidal marsh restoration (Draft BDCP Section 3.4.10.3). All restored areas will be secured in~~
38 ~~fee-title or through conservation easements.~~

39 ~~Alternative 4 would also result in the protection and management of the following natural~~
40 ~~communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool~~
41 ~~complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50~~
42 ~~acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands~~
43 ~~will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and~~
44 ~~agricultural ditches.~~

1 The Plan under Alternative 4 would also implement AMMs 1-7, 10, 12, 30, 34, and 36, which would
2 avoid and minimize fill of waters of the U.S. and any indirect effects to wetlands and waters. As
3 stated above, specific mitigation would be required to ensure that Alternative 4 does not result in a
4 loss of functions and values of waters of the U.S. Mitigation Measure BIO-176, *Compensatory*
5 *Mitigation for Fill of Waters of the U.S.*, would be available to reduce the impact to a less-than-
6 significant level.

7 The permanent and temporary loss of potential jurisdictional wetlands as a result of constructing
8 Alternative 4 water conveyance facilities would be substantial if not compensated for by wetland
9 protection and/or restoration. This loss would represent either temporary or permanent removal of
10 federally protected wetlands or other waters of the United States as defined by Section 404 of the
11 CWA. However, Alternative 4 includes conservation measures (CM4 and CM10) that would restore
12 and protect large acreages of both tidal and nontidal wetlands and open water. Through the course
13 of the BDCP restoration program, this alternative would result in restoration of 65,000 acres of tidal
14 and 1,200 acres of nontidal wetlands and open water. Impacts on wetlands from CM1 construction
15 would occur in the first 10 years after BDCP approval. Approximately 19,550 acres of this wetland
16 restoration would occur during this time period, thereby offsetting the impacts of CM1 construction.
17 These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for Alternative 4
18 with either 10-foot high RTM storage sites (338 acres) or 6-foot high sites (484 acres). Therefore,
19 there would be a beneficial impact on potential jurisdictional wetlands and waters of the United
20 States resulting from Alternative 4 implementation.

21 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.**

22 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
23 success monitoring, long-term preservation, and long-term maintenance and monitoring
24 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
25 replace lost function through the mechanisms discussed below which will result in restoration
26 and/or creation of habitat with at least as much function and value as those of the impacted
27 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
28 than that of impacted habitat.

29 Compensation ratios are driven by type, condition, and location of replacement habitat as
30 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
31 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
32 accept preservation as the only form of mitigation; use of preservation as mitigation typically
33 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
34 minimum of 1:1, depending on the factors listed above.

35 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
36 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
37 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
38 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
39 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
40 combination of the following methods:

- 41 ● Purchase credits for restored/created/rehabilitated habitat at an approved wetland
42 mitigation bank;

- 1 • On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
- 2 converted to uplands due to past land use activities (such as agriculture) or functionally
- 3 degraded by such activities;
- 4 • On-site (adjacent to the project footprint) creation of aquatic habitat;
- 5 • Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
- 6 due to past land use activities (such as agriculture) or functionally degraded by such
- 7 activities;
- 8 • Off-site (within the Delta) creation of aquatic habitat; and/or
- 9 • Payment into the Corps' Fee-in-Lieu program.

10 Purchase of Credits or Payment into Fee-in-Lieu Program

11 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be

12 utilized for habitat types that would be difficult to restore or create within the Delta. Examples

13 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very

14 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil

15 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into

16 these categories.

17 On-Site Restoration, Rehabilitation and/or Creation

18 Much of the Delta consists of degraded or converted habitat that is more or less functioning as

19 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation

20 could occur immediately adjacent to the project footprint. It is anticipated that some of the

21 compensatory mitigation will fall into this category.

22 Off-Site Restoration, Rehabilitation and/or Creation

23 There exists, within the immediate vicinity of the project area, Delta land which has been subject

24 to agricultural practices or other land uses which have degraded or even converted wetlands

25 that existed historically. Sites within the Delta will be evaluated for their restoration,

26 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory

27 mitigation will fall into this category.

28 Compensatory mitigation will result in no net loss of acreage of Waters of the U.S. and will

29 accomplish full functional replacement of impacted wetlands. All impacted wetlands will be

30 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water

31 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function

32 at significantly less than high levels, the compensatory mitigation will result in a significant net

33 increase in wetland function.

34 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**

35 **Wetlands and Other Waters of the United States**

36 The habitat protection and restoration activities associated with Alternative 4's other conservation

37 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of

38 the United StatesU.S. in the study area over the course of BDCP conservation action implementation.

39 Because these conservation measures have not been defined to the level of site-specific footprints, it

40 is not possible to delineate and quantify these effects in detail. Several of the conservation measures

1 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects
2 analysis contained in ~~BDCP~~ Chapter 5, Effects Analysis, of the Draft BDCP;

3 ~~**Effects Analysis-**Because the wetland delineation was only conducted within the Conveyance
4 Planning Area and not the remainder of the Plan Area, the effects on potential wetlands and waters
5 of the U.S. United States from CM2-CM10 were analyzed by looking at effects on wetland natural
6 communities mapped within the theoretical footprints for CM2, CM4, and CM5 by assuming that
7 100% of the predominantly wetland natural communities listed in Table 12E-37 of Appendix 12E
8 found in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS and that 10% of
9 all of the non-wetland natural communities listed in that table would qualify as wetlands or other
10 waters of the United States under the CWA. These theoretical footprints have been used to predict
11 the acres of natural communities that would be affected through loss or conversion, which gives
12 some indication of jurisdictional wetland effects. Based on this approach, approximately 19,850
13 acres of potentially jurisdictional wetlands and waters could be affected by CM2-CM10. The majority
14 of these impacts are attributable to the conversion of 13,746 acres of managed wetland to tidal
15 marsh under CM4, which would likely result in an improvement of wetland function in the Plan
16 Area. Any CM2-CM10 effects ascribed to tidal perennial aquatic, tidal brackish emergent, tidal
17 freshwater emergent, other natural seasonal, nontidal freshwater perennial emergent, and nontidal
18 perennial aquatic wetlands natural communities are likely to also be effects on wetlands and other
19 waters of the United States. Effects ascribed to other natural communities and land cover types with
20 small jurisdictional wetland components (valley/foothill riparian, alkali seasonal wetland complex,
21 vernal pool complex, managed wetland, grassland and cultivated land) are not easily converted to
22 effects on wetlands and other waters of the United States by the use of theoretical footprints.
23 Because of this lack of detail, a programmatic assessment is provided for these other conservation
24 measures.~~

25 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland
26 natural communities through implementation of CM2-CM10 for Alternative 4 would be ~~in the range~~
27 ~~of 5,500 to approximately 6,000~~ 19,850 acres, assuming that 100% of the predominantly wetland
28 natural communities listed in Table 12-4-69 and that 10% of all of the non-wetland natural
29 communities listed in that table would qualify as wetlands or other waters of the United States
30 under the CWA. Most of these wetlands would be converted to tidal ~~and nontidal~~ wetlands and open
31 water through implementation of CM4, and CM10. The wetlands and open water created by these
32 two restoration actions would be approximately 66,200 acres, Although the increase in wetland
33 acreage and wetland functions from these restoration actions could in part offset the effects on
34 waters of the U.S. occurring in these areas, implementation of Mitigation Measure BIO-176,
35 Compensatory Mitigation for Fill of Waters of the U.S., would be required to ensure that these effects
36 are not adverse. far exceeding what is required under the no net loss policy used by the USACE in
37 considering Section 404 permits, even if one were to assume that all conversions represented a
38 functional wetland loss. Therefore, there would be a beneficial effect on potential jurisdictional
39 wetlands and other waters of the United States from implementing CM2-CM10.

40 **CEQA Conclusion:** The conversion of existing wetland natural communities to other types of
41 wetland natural communities through implementation of CM2-CM10 for Alternative 4 would be
42 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
43 water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities
44 would be restored under Alternative 4. Although the increase in wetland acreage and wetland
45 functions from this restoration could in part offset the effects on waters of the U.S. occurring in these
46 areas, implementation of Mitigation Measure BIO-176, Compensatory Mitigation for Fill of Waters of

1 ~~the U.S., would be required to ensure that the impacts are reduced to a less-than-significant level.~~
2 ~~The permanent and temporary loss of potential jurisdictional wetlands as a result of implementing~~
3 ~~the other conservation measures (CM2–CM10) of Alternative 4 would be a substantial effect if not~~
4 ~~compensated for by wetland protection and/or restoration. This loss would represent a removal of~~
5 ~~federally protected wetlands or other waters of the United States as defined by Section 404 of the~~
6 ~~CWA. However, Alternative 4 includes conservation measures (CM4 and CM10) that would restore~~
7 ~~large acreages of both tidal and nontidal wetlands and open water in the study area. Over the life of~~
8 ~~the BDCP restoration program, this alternative would result in restoration of 66,200 acres of tidal~~
9 ~~and nontidal wetlands and open water, of which 19,550 acres would be restored in the first 10~~
10 ~~years. These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for~~
11 ~~Alternative 4 (5,500–6,000 acres). Therefore, there would be a beneficial impact on potential~~
12 ~~jurisdictional wetlands and other waters of the United States from implementing CM2–CM10 under~~
13 ~~Alternative 4.~~

14 **Shorebirds and Waterfowl**

15 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,
16 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for
17 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for
18 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to
19 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to
20 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether
21 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture
22 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts
23 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat
24 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of
25 population abundance objectives and the use of species-habitat models to link population objectives
26 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives
27 into habitat objectives, while explicitly identifying the biological assumptions that underpin these
28 models and the data used to populate them. As a result, the CVJV's biological planning provides a
29 framework for evaluating the effects of the BDCP on waterfowl.

30 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all
31 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,
32 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The
33 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn
34 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food
35 supplies for geese would still be well in excess of demand even with the loss of these agricultural
36 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives
37 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of
38 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly
39 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging
40 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to
41 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report
42 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model
43 used to quantify effects on food biomass and food quality.

44 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and
45 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase

1 and decrease in natural communities known to provide important foraging, roosting, and breeding
2 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley
3 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural
4 community losses and gains were then translated into species-specific outcomes, comparing the
5 relative habitat value of each BDCP natural community for each Central Valley shorebird species
6 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF
7 International 2013) was modified from a table in Stralberg et. al. (2011). The table was created
8 using survey data and experts' species-specific habitat rankings. The survey data included fall,
9 winter, and spring density data. This resulted in an overall, cross-season representation of habitat
10 requirements.

11 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**
12 **Water Conveyance Facilities Construction**

13 Development of the water conveyance facilities (CM1) would result in the permanent removal of
14 approximately ~~7-22~~ acres of managed wetland, ~~6-3~~ acres of tidal wetlands, ~~59-61~~ acres of nontidal
15 wetlands, and ~~3,729-768~~ acres of suitable cultivated lands (including grain and hay crops, pasture,
16 field crops, rice, and idle lands). In addition, ~~28-29~~ acres of managed wetland, ~~40-15~~ acres of tidal
17 wetlands, ~~42-15~~ acres of nontidal wetlands, and ~~843-1,339~~ acres of suitable cultivated lands would
18 be temporarily impacted. No rice would be impacted as a result of constructing the water
19 conveyance facilities. These losses of habitat would occur within the first 10 years of Alternative 4
20 implementation in the Delta Basin. The BDCP has committed to the near-term protection of 15,400
21 acres of non-rice cultivated lands, 200 acres of rice, and 700 acres of rice or "rice equivalent" natural
22 communities including nontidal wetlands in the near-term. In addition, 4,100 acres of managed
23 wetlands would be created, protected, and enhanced, 8,850 acres of freshwater tidal wetlands
24 would be restored, and 2,000 acres of tidal brackish emergent wetland would be restored ([see](#) Table
25 3-4, [in](#) Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*).

26 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were
27 present in or adjacent to work areas and could result in destruction of nests or disturbance of
28 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
29 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on
30 nesting birds.

31 **NEPA Effects:** Habitat loss from construction of the Alternative 4 water conveyance facilities would
32 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural
33 communities and cultivated lands that would be restored and protected in the near-term timeframe.
34 If waterfowl were present in or adjacent to work areas, construction activities could result in
35 destruction of nests or disturbance of nesting and foraging behaviors, which would ~~be represent~~ an
36 adverse affect on nesting shorebirds and waterfowl ~~individuals~~. Mitigation Measure BIO-75, *Conduct*
37 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
38 minimize adverse effects on nesting birds.

39 **CEQA Conclusion:** ~~In the absence of other conservation actions, H~~habitat loss from construction of
40 the Alternative 4 water conveyance facilities ~~would could have a less than significant impact on~~
41 ~~represent an adverse effect on~~ shorebirds and waterfowl ~~through habitat modification. However,~~
42 ~~because with~~ of the acres of natural communities and cultivated lands that would be restored and
43 protected in the near-term timeframe, ~~this impact would be less than significant~~. If waterfowl were
44 present in or adjacent to work areas, construction activities could result in destruction of nests or

1 disturbance of nesting and foraging behaviors, which would be a significant impact. Implementation
2 of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
3 *Nesting Birds*, which would identify nesting birds prior to disturbance and would allow for
4 avoidance measures, would reduce this impact on nesting birds to a less-than-significant level.

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 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**
9 **Implementation of Conservation Components**

10 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated
11 8,818 acres as a result of implementing Alternative 4. This would represent a 25% decrease in
12 managed seasonal wetlands compared with long-term conditions without Alternative 4 (Ducks
13 Unlimited 2013, Table 5; ICF International 2013). There is considerable uncertainty about the
14 biomass and nutritional quality of waterfowl foods produced in Suisun Marsh's managed wetlands,
15 which makes it difficult to identify the amount of mitigation needed. To address this uncertainty,
16 three levels of food biomass and three levels of nutritional quality were modeled for these existing
17 habitats (Ducks Unlimited 2013, Table 7). Three mitigation scenarios were based on these energetic
18 assumptions of biomass and food quality were then run to determine a minimum acreage of
19 managed seasonal wetlands to be protected and enhanced to compensate for the loss of productivity
20 from habitat conversion to tidal wetlands.

- 21 • Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low
22 food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce
23 50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds
24 have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the
25 assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to provide high
26 food biomass and high food quality (equal to wetlands in the Central Valley), 5,000 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 2) Assume that the managed seasonal wetlands lost provide medium food biomass and
30 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh
31 produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and
32 these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.
33 Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to
34 provide high food biomass and high food quality (equal to wetlands in the Central Valley),
35 13,300 acres of managed wetlands protected and managed for high biomass and high food
36 quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal
37 marsh.
- 38 • Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low
39 food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only
40 be enhanced to provide medium food biomass and medium food quality (produce 75% of the
41 seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds have 80% of
42 the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of managed

1 wetlands protected and managed for medium biomass and medium food quality would mitigate
2 the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

3 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed
4 seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat
5 conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced
6 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing
7 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food
8 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high
9 biomass and high food quality. However, the food biomass and productivity in Suisun Marsh would
10 need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an adverse
11 effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be needed.
12 Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl in*
13 *Suisun Marsh*, would be available to address this adverse effect.

14 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000
15 acres of palustrine tidal wetlands in the Delta Watershed, and the replacement of 600 acres of
16 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo Watershed
17 would not be expected to have an adverse effect on food productivity, under the assumption that
18 these wetlands would provide adequate food sources. However, a monitoring component and a food
19 study in these tidal habitats would be necessary order to demonstrate that there is a less-than-
20 significant loss of food value in these habitats for wintering waterfowl. If it is determined from
21 monitoring, that there is in fact a significant loss in food productivity from habitat conversion to
22 tidal wetlands, the protection and enhancement of managed wetlands in these watersheds would be
23 required to mitigate the change in food biomass and quality. Mitigation Measure BIO-179b, *Conduct*
24 *Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and*
25 *Delta Basins*, would be available to address this uncertainty.

26 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of
27 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
28 the level of effect that Alternative 4 habitat loss or conversion would have. The BDCP has committed
29 to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in Suisun
30 Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal marsh. Of
31 ~~this~~these 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl. This
32 minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
33 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing
34 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food
35 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high
36 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would
37 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 4 to avoid an
38 adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a, *Conduct*
39 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to address
40 this adverse effect.

41 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
42 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
43 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
44 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would
45 provide adequate food sources is entirely dependent on assumptions about food production in

1 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*
2 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be
3 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

4 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of
5 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
6 the level of impact that Alternative 4 habitat loss or conversion would have. The BDCP has
7 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
8 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
9 marsh. Of ~~this~~these 6,600 acres, at least 5,000 acres would be managed to benefit wintering
10 waterfowl. This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the
11 reduced productivity resulting from conversion of managed seasonal wetlands under the
12 assumptions that 1) existing managed seasonal wetlands on average in Suisun Marsh provide low
13 biomass and low-quality food for wintering waterfowl and 2) protected seasonal wetlands can be
14 managed to produce high biomass and high-quality food. However, the food biomass and
15 productivity in Suisun Marsh would need to be quantified to determine if the 5,000 acres would be
16 sufficient for Alternative 4 to avoid having a significant impact on wintering waterfowl in the Suisun
17 Marsh, or if additional mitigation would be needed. Implementation of Mitigation Measure BIO-
18 179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address
19 this potential significant impact.

20 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
21 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
22 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
23 food productivity. However, the conclusion that these tidal wetlands would provide adequate food
24 sources for wintering waterfowl is entirely dependent on assumptions about food production in
25 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are
26 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and
27 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*
28 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address
29 this uncertainty and would reduce ~~this~~the impact on loss or conversion of habitat for wintering
30 waterfowl to a less-than-significant level.

31 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering** 32 **Waterfowl in Suisun Marsh**

33 Poorly managed wetlands (considered low biomass and food quality) will be identified and
34 managed by BDCP proponents to improve food quality and biomass. Studies will be required to
35 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic
36 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to
37 measure changes in the energetic productivity of these sites. Based on the food studies and
38 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres
39 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with
40 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates
41 that additional acreage is needed to meet this goal, additional acreage of protection or creation
42 of managed wetlands and management will be required.

1 **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**
2 **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

3 In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and
4 Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and
5 monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies
6 show that the assumption of no effect was inaccurate, and the food quality goal of 1:1
7 compensation for wintering waterfowl food value is not met, additional acreage of protection or
8 creation of managed wetland and management will be required.

9 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**
10 **of Conservation Components**

11 **Yolo and Delta Basins:** Implementation of Alternative 4 would reduce managed wetlands in the
12 Yolo and Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of
13 these wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce
14 semipermanent wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres
15 respectively. While a reduction in these semipermanent habitats would represent a habitat loss for
16 breeding waterfowl, with the restoration of 24,000 acres of palustrine tidal wetlands ([see Table 3-4;](#)
17 [in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*](#)) in the Yolo and Delta basins there
18 would be a less than adverse effect on breeding waterfowl. These palustrine habitats would
19 presumably contain water during the breeding period (i.e., March through July), and would be
20 expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo
21 and Delta watersheds attributed to Alternative 4.

22 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640
23 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.
24 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset
25 the loss of breeding habitat, but this could further reduce food supplies available to wintering
26 waterfowl under the assumption that semi-permanent wetlands provide few food resources
27 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

28 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded
29 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000
30 acres of semipermanent wetlands that would be protected and enhanced for wintering and
31 migratory waterfowl ([see Table 3-4, in Chapter 3, *Description of Alternatives, of this RDEIR/SDEIS*](#);
32 Objective MWNC1.1 in [BDCP Chapter 3, *Conservation Strategy, of the Draft BDCP*](#)).

33 Food studies and monitoring would be necessary to determine how increases in tidal marsh and
34 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be
35 needed in order to quantify impacts to breeding waterfowl in Suisun Marsh and to determine not
36 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for
37 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*
38 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the
39 uncertainty of this effect.

40 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains
41 several key upland areas that have significant nesting value. The largest block of upland habitat in
42 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the
43 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area

1 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities
2 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this
3 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints
4 were changed during the implementation process of BDCP to overlap with this area, the effects on
5 breeding waterfowl would likely be greatly increased.

6 **NEPA Effects:** Implementation of Alternative 4 would reduce managed wetlands in the Yolo and
7 Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of these
8 wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce semi-permanent
9 wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres, respectively. The
10 reduction in these semi-permanent habitats would represent a habitat loss for breeding waterfowl.
11 However, with the restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta
12 basins, Alternative 4 would not have an adverse effect on breeding waterfowl. These palustrine
13 habitats would presumably contain water during the breeding period (March through July), and
14 would be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in
15 the Yolo and Delta watersheds attributed to Alternative 4 implementation. Total managed wetlands
16 in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the conversion of managed
17 seasonal and semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands
18 could be managed as semi-permanent wetlands to offset the loss of breeding habitat, but such
19 management could further reduce food supplies available to wintering waterfowl under the
20 assumption that semi-permanent wetlands provide few food resources compared with seasonally
21 managed habitats. The protection and enhancement of 1,600 acres of permanently flooded managed
22 wetlands would provide habitat for breeding waterfowl. However, food studies and monitoring
23 would be necessary to determine how increases in tidal marsh and salinity levels would affect the
24 overall reproductive capacity of the marsh. Therefore, the loss of breeding waterfowl habitat
25 resulting from implementation of Alternative 4 could have an adverse effect. Mitigation Measure
26 BIO-180, *Conduct Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be
27 available to address the uncertainty of model assumptions and the potential adverse effect of habitat
28 conversion on breeding waterfowl in Suisun Marsh.

29 **CEQA Conclusion:** Implementation of Alternative 4 would reduce managed wetlands in the Yolo and
30 Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of these
31 wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce semipermanent
32 wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. The
33 reduction in these semi-permanent habitats would represent a habitat loss for breeding waterfowl.
34 However, with the restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta
35 basins, Alternative 4 would have a less-than-significant impact on breeding waterfowl. These
36 palustrine habitats would presumably contain water during the breeding period (March through
37 July), and would be expected to compensate for the loss of 280 acres of managed semi-permanent
38 wetlands in the Yolo and Delta watersheds attributed to Alternative 4.

39 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the
40 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the
41 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of
42 breeding habitat, but this management could further reduce food supplies available to wintering
43 waterfowl under the assumption that semi-permanent wetlands provide few food resources
44 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of
45 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,
46 food studies and monitoring would be necessary to determine how increases in tidal marsh and

1 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or
2 conversion of habitat from implementation of Alternative 4 could have a significant impact on
3 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food*
4 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of
5 model assumptions and reduce ~~the impact~~the impact to a less-than-significant level.

6 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding** 7 **Waterfowl in Suisun Marsh**

8 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on
9 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine
10 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of
11 the marsh.

12 The required studies will examine how increases in tidal marsh and salinity levels will affect the
13 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be
14 limited to the following questions:

- 15 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus
16 managed habitats and across salinity gradients?
- 17 • How does waterfowl nest success and nest density vary with respect to tidal versus
18 managed habitats and across salinity gradients?
- 19 • What are the patterns of habitat selection and movements by waterfowl broods in relation
20 to tidal vs. managed habitats, and are there impacts on duckling survival?
- 21 • What is the current relationship between waterfowl reproductive success and interactions
22 with alternate prey and predators, and how is tidal restoration likely to alter these
23 relationships?

24 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from ~~the~~ Implementation of** 25 **Conservation Components**

26 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat
27 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of
28 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,
29 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide
30 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford
31 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of
32 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and
33 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type
34 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the
35 majority of shorebird species require water depths of approximately 10–20 cm for foraging (Isola et
36 al. 2000, Hickey et al. 2003).

37 ***Managed Wetlands***

38 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo
39 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of
40 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by
41 construction-related activities associated with tidal restoration (CM4) and Fisheries Enhancement

1 activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and
2 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could
3 periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of
4 1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs in the Yolo Basin ([see](#) Table
5 5.4-2, in [BDCP](#) Chapter 5, *Effects Analysis, of the Draft BDCP*).

6 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently
7 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF
8 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

9 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be
10 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table
11 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun
12 Basin.

13 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
14 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt
15 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher
16 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),
17 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a rank
18 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and whimbrel
19 (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

20 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most
21 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of
22 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200
23 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres
24 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging
25 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the
26 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500
27 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some
28 benefit to wintering and breeding shorebirds.

29 **Cultivated Lands**

30 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities
31 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272
32 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and
33 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an
34 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512
35 acres during a notch flow of 6,000 cfs ([see](#) Table 5.4-2, in [BDCP](#) Chapter 5, *Effects Analysis, of the*
36 [Draft BDCP](#)).

37 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration
38 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an
39 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted
40 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the
41 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

42 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
43 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*

1 *vociferous*), long-billed curlew, and whimbrel within pasture habitat and sandhill crane was ranked
2 1 for grain and hay crops. Long-billed dowitcher and killdeer both had a rank 2 for idle crop habitat
3 suitability and black-bellied plover was ranked 2 for pasture habitat. Red-necked phalarope
4 (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus tricolor*) were both ranked 2 for grain and
5 hay crops. Long-billed dowitcher, dunlin, least sandpiper, and long-billed curlew were all ranked 3
6 for rice habitat suitability and killdeer was ranked 3 for field crop habitat suitability.

7 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in
8 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,
9 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated
10 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production
11 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not
12 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and
13 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-
14 tailed kite, and greater sandhill crane.

15 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while
16 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF
17 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's
18 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

19 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total
20 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant
21 garter snake.

22 **Tidal Wetlands**

23 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
24 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres
25 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by
26 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF
27 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in
28 Yolo Basin.

29 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as
30 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently
31 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of
32 tidal wetlands in Delta Basin.

33 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently
34 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF
35 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

36 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
37 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least
38 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher
39 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew
40 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.
41 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For
42 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-
43 billed curlew and whimbrel were both ranked 3 for habitat suitability.

1 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large
2 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of
3 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal
4 mudflats in response to sea level rise. ~~BDCP~~ Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment,*
5 *of the Draft BDCP* details the methods and assumptions modeled to come about this result. Tidal
6 mudflat habitats would be expected to require management, however, sediment augmentation has
7 been discussed as an experimental method that could be employed in places like Suisun to combat
8 the loss of intertidal marshes in the face of sea level rise and reduced sediment supplies.

9 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).
10 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and
11 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on
12 these lands would be likely to be focused on nonnative, invasive species management. Any
13 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California
14 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and
15 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant
16 garter snake.

17 ***Nontidal Wetlands***

18 **Yolo Basin:** As a result of tidal restoration (CM4) and fisheries enhancement activities (CM2) within
19 the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119 acres of
20 which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily lost by
21 construction-related activities associated with fisheries enhancement activities (CM2) (Table 2, ICF
22 International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont Weir
23 operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically nontidal
24 perennial aquatic habitat.

25 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted
26 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International
27 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5
28 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from
29 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

30 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool
31 complex, would be permanently converted as a result of tidal restoration (CM4); and is not
32 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural
33 community type in Suisun Basin.

34 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
35 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and
36 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for
37 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat
38 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal
39 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial
40 emergent wetland habitat suitability.

41 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP
42 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant

1 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo
2 Basin (in the Cache Slough area).

3 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be
4 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss
5 could be permitted under the Plan. Protection of vernal pool complex natural community would
6 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).
7 Protection of these two community types would enhance and manage habitat for vernal pool
8 crustaceans and alkali-related plant species.

9 The protection and restoration of natural communities would also include management and
10 enhancement actions under *CM11 Natural Communities Enhancement and Management*. The
11 following management activities to benefit shorebirds would be considered for implementation
12 under CM11 in areas where they would not conflict with covered species management.

13 ● Managed wetlands:

14 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for
15 foraging shorebirds and islands for nesting (Hickey et al. 2003).

16 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize
17 the extent of shallow-water habitat; varying depths within the wetland unit helps to create
18 temporal variation in foraging opportunities. During warm, dry springs when wetland units
19 dry quickly, wetland units can be re-supplied with water to extend habitat availability for
20 shorebirds.

21 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped
22 edges for nesting shorebirds between April and July.

23 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting
24 and nesting.

25 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep
26 angles.

27 ○ Limit levee maintenance during the nesting season (April through July). However, mowing
28 the center of levees is fine.

29 ○ Potentially add material to levees or to islands to encourage nesting for some species.

30 ● Cultivated Lands:

31 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote
32 a diverse community of waterbirds, including shorebirds, during fall migration and winter
33 (Shuford et al. 2013).

34 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a
35 combination of flooding practices that include one-time water application and maintenance
36 flooding while also providing unflooded habitat (Strum et al. *in review*).

37 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July- September)
38 can provide substantial benefits to shorebirds at a time of very limited shallow-water
39 habitat on the landscape (Shuford et al. 2013).

- 1 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to
2 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because
3 this practice may not be as effective on soils that drain quickly.
- 4 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to
5 increase the potential shorebird habitat on intentionally flooded or unflooded fields that
6 may passively gather rain water (Iglecia et al. 2012).
- 7 ○ Shallowly flood available agricultural fields during July, August, and September to provide
8 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to
9 flooding, have minimal micro-topography (e.g. no large clods), and should remain flooded
10 for up to three week periods (after three weeks, vegetation encroachment reduces habitat
11 value for shorebirds; ICF International 2013).
- 12 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or
13 drive on levees during the nesting season (April- July, Iglecia et al. 2012).
- 14 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of
15 wider levees (Iglecia et al. 2012).
- 16 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to
17 provide nesting habitat for American avocets (Iglecia et al. 2012).
- 18 ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be
19 more appealing for nesting shorebirds (Iglecia et al. 2012).
- 20 ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
- 21 ○ Islands should be disked along with the rest of the field after harvest to help inhibit
22 vegetation growth (Iglecia et al. 2012).

23 **NEPA Effects:** Alternative 4 implementation would result in the conversion of managed wetland and
24 cultivated lands to tidal natural communities, including tidal mudflat. The result would be
25 substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,
26 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
27 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
28 willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and
29 management of the remaining acres would likely have substantial benefits for select species of
30 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
31 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
32 and rice types. While the protection, enhancement, and management of these crop types are being
33 driven by covered species, these management actions would also benefit shorebirds. The protection,
34 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
35 for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would
36 be unlikely to compensate for the overall loss. However, with the protection and restoration of acres
37 in the Delta and Yolo watersheds, in addition to the implementation of the management actions
38 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not
39 be expected to result in an adverse effect on shorebird populations in the study area.

40 **CEQA Conclusion:** Alternative 4 implementation would result in the conversion of managed wetland
41 and cultivated lands to tidal natural communities, including tidal mudflat. The result would be
42 significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs, and
43 long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least

1 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
2 willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and
3 management of the remaining acres would likely have substantial benefits for select species of
4 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
5 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
6 and rice types. While the protection, enhancement, and management of these types are being driven
7 by covered species, these management actions would also benefit shorebirds. The protection,
8 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
9 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be
10 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in
11 the Delta and Yolo watersheds, in addition to the implementation of the management actions
12 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be
13 expected to have a less-than-significant impact on shorebird populations in the study area.

14 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical** 15 **Transmission Facilities**

16 New transmission lines installed in the study area would increase the risk for bird-power line
17 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network
18 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New
19 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl
20 species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill*
21 *Crane* would reduce potential effects through the installation of flight-diverters on new transmission
22 lines, and selected existing transmission lines in the study area.

23 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power
24 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the
25 construction of new transmission lines on shorebird and waterfowl would not be adverse.

26 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl
27 power line strikes which could have a substantial adverse effect as a result of direct mortality. This
28 impact would be significant. The implementation of *AMM20 Greater Sandhill Crane* would reduce the
29 potential impact of power line strikes from the construction of new transmission lines on shorebirds
30 and waterfowl to a less-than-significant level.

31 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

32 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated
33 with construction-related activities could result in temporary disturbances that affect shorebird and
34 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,
35 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
36 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
37 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
38 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
39 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
40 of mechanical equipment during water conveyance construction could cause the accidental release
41 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the
42 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
43 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge

1 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have
2 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to
3 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
4 work areas.

5 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
6 mercury in ~~avian species, including~~ shorebird and waterfowl species. ~~Marsh (tidal and nontidal) and~~
7 ~~floodplain restoration have the potential to increase exposure to methylmercury.~~ Mercury is
8 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
9 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al.
10 2008). ~~Bioaccumulation of methylmercury varies by species as there are taxonomic~~
11 ~~differences in rates of detoxification within the liver (Eagles-Smith et al. 2009). Organisms feeding~~
12 ~~within pelagic-based (algal) food webs have been found to have higher concentrations of~~
13 ~~methylmercury than those in benthic or epibenthic food webs; this has been attributed to food chain~~
14 ~~length and dietary segregation (Grimaldo et al. 2009). That is, the pelagic food chain tends to be~~
15 ~~longer than the benthic food chain, which allows for greater biomagnification of methylmercury in~~
16 ~~top predators. Also, there is less prey diversity at the top of the pelagic food chain than in the~~
17 ~~benthic food chain; pelagic top predators eat smaller fish and little else, while benthic top predators~~
18 ~~consume a variety of organisms, many of which are lower in the food chain than fishes and thus have~~
19 ~~less potential for methylmercury biomagnification. Shorebirds and waterfowl that forage on~~
20 ~~invertebrates and bivalves, may therefore have lower concentrations of methylmercury than diving~~
21 ~~ducks that forage on fish. Thus, BDCP restoration activities that create newly inundated areas could~~
22 ~~increase bioavailability of mercury (see BDCP Chapter 3, Conservation Strategy, for details of~~
23 ~~restoration). Species sensitivity to methylmercury differs widely and there is a large amount of~~
24 ~~uncertainty with respect to species-specific effects. A detailed review of the methylmercury issues~~
25 ~~associated with implementation of the BDCP areis contained in Appendix D, Substantive BDCP~~
26 ~~Revisions, of this RDEIR/SDEIS. Appendix D which~~ The review includes an overview of the BDCP-
27 ~~related mechanisms that could result in increased mercury in the food web, and how exposure to~~
28 ~~individual species may occur based on feeding habits and where their habitat overlaps with the~~
29 ~~areas where mercury bioavailability could increase.~~

30 ~~Largemouth bass was used as a surrogate species for analysis (Appendix D, Substantive BDCP~~
31 ~~Revisions, of this RDEIR/SDEIS. Appendix D) and the modeled effects of mercury concentrations from~~
32 ~~changes in water operations under CM1 on largemouth bass did not differ substantially from~~
33 ~~existing conditions; therefore, results also indicate that shorebird and waterfowl mercury tissue~~
34 ~~concentrations would not measurably increase as a result of CM1 implementation.~~

35 ~~Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,~~
36 ~~especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.~~
37 ~~Thus, BDCP restoration activities that create newly inundated areas (CM4 and CM5) could increase~~
38 ~~bioavailability of mercury. In general, the highest methylation rates are associated with high tidal~~
39 ~~marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers~~
40 ~~et al. 2008). Increased methylmercury associated with natural community and floodplain~~
41 ~~restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as~~
42 ~~described in the BDCP Appendix 5.D, Contaminants).~~ Mercury is generally elevated throughout the
43 ~~Delta, and restoration of the lower potential areas in total may result in generalized, very low level~~
44 ~~increases of mercury. Given that some species have elevated mercury tissue levels pre-BDCP, these~~
45 ~~low level increases could result in some level of effects. Restoration in Suisun Marsh would convert~~

1 managed wetlands to tidal wetlands, which would be expected to result in an overall reduction in
2 mercury methylation.

3 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
4 into the foodweb, CM12 Methylmercury Management, is included to provide for site-specific
5 evaluation for each restoration project. On a project-specific basis, where high potential for
6 methylmercury production is identified that restoration design and adaptive management cannot
7 fully address while also meeting restoration objectives, alternate restoration areas will
8 be considered. CM-12 will
9 be implemented in coordination with other similar efforts to address
10 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
11 conservation measure will
12 include the following actions.

- 11 • Assess pre-restoration conditions to determine the risk that the project could result in increased
12 mercury methylation and bioavailability
- 13 • Define design elements that minimize conditions conducive to generation of methylmercury in
14 restored areas.
- 15 • Define adaptive management strategies that can be implemented to monitor and minimize
16 actual postrestoration creation and mobilization of methylmercury.

17 ~~In addition, the potential mobilization or creation of methylmercury within the Plan Area varies~~
18 ~~with site-specific conditions and would need to be assessed at the project level. Measures described~~
19 ~~in BDCP Chapter 3, Section 3.4.12, Conservation Measure 12 Methylmercury Management, include~~
20 ~~provisions for project-specific Mercury Management Plans. Site-specific restoration plans that~~
21 ~~address the creation and mobilization of mercury, as well as monitoring and adaptive management~~
22 ~~as described in CM12 would be available to address the uncertainty of methylmercury levels in~~
23 ~~restored tidal marsh and potential impacts on shorebirds and waterfowl.~~

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.

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 shorebird and waterfowl
4 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
5 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
6 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
7 bioavailability of selenium (see [BDCP-Chapter 3, Conservation Strategy, of the Draft BDCP](#) for details
8 of restoration). Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality, of*
9 [the Draft EIR/EIS](#) and it was determined that, relative to Existing Conditions and the No Action
10 Alternative, CM1 would not result in substantial, long-term increases in selenium concentrations in
11 water in the Delta under any alternative. However, it is difficult to determine whether the effects of
12 potential increases in selenium bioavailability associated with restoration-related conservation
13 measures (CM4 and CM5) would lead to adverse effects on shorebirds and waterfowl species.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
15 substantial effect on shorebirds and waterfowl from increases in selenium associated with
16 restoration activities. This effect would be addressed through the implementation of *AMM27*
17 *Selenium Management* ([Appendix D, Substantive BDCP Revisions, of this RDEIR/SDEIS/BDCP](#)
18 [Appendix 3.C, Avoidance and Minimization Measures](#)) which would provide specific tidal habitat
19 restoration design elements to reduce the potential for bioaccumulation of selenium and its
20 bioavailability in tidal habitats. Furthermore, the effectiveness of selenium management to reduce
21 selenium concentrations and/or bioaccumulation would be evaluated separately for each
22 restoration effort as part of design and implementation. This avoidance and minimization measure
23 would be implemented as part of the tidal habitat restoration design schedule.

24 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 4 water
25 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work
26 areas. Moreover, operation and maintenance of the water conveyance facilities, including the
27 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
28 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these
29 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
30 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.

31 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
32 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
33 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
34 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the
35 indirect effects associated with noise and visual disturbances, and increased exposure to selenium
36 from Alternative 4 implementation would not have an adverse effect on shorebirds and waterfowl.

37 [Changes in water operations under CM1 would not be expected to result in increased mercury](#)
38 [bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased](#)
39 [exposure of California least tern to methylmercury. There is potential for increased exposure of the](#)
40 [foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of](#)
41 [mercury available in the soils and the biogeochemical conditions. However, the concentrations of](#)
42 [methylmercury that are harmful varies by species, and the potential for increased exposure varies](#)
43 [substantially within the study area. Implementation of CM12 which contains measures to assess the](#)
44 [amount of mercury before project development, followed by appropriate design and adaptation](#)

1 management, would minimize the potential for increased methylmercury exposure, and would
2 result in no adverse effect on shorebirds and waterfowl.

3 ~~Tidal habitat restoration is unlikely to have an adverse effect on shorebirds and waterfowl through~~
4 ~~increased exposure to methylmercury, as these species currently nest and forage in tidal marshes~~
5 ~~with elevated methylmercury levels. However, it is unknown what concentrations of methylmercury~~
6 ~~are harmful to species of waterfowl and shorebirds, and the potential for increased exposure would~~
7 ~~vary substantially within the study area. Site-specific restoration plans in addition to monitoring and~~
8 ~~adaptive management, described in *CM12 Methylmercury Management*, would address the~~
9 ~~uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other~~
10 ~~information is developed, the site-specific planning phase of marsh restoration would be the~~
11 ~~appropriate place to assess the potential risk of shorebird and waterfowl exposure to~~
12 ~~methylmercury.~~

13 **CEQA Conclusion:** ~~Noise~~Indirect effects that include noise and visual disturbance, potential
14 hazardous spills, ~~and~~ increased dust and sedimentation, and increased methylmercury and selenium
15 exposure as a result of Alternative 4 water conveyance facilities construction and operation and
16 maintenance would represent an adverse effect as a result of habitat modification and potential for
17 direct mortality of shorebirds and waterfowl in the absence of other conservation actions. This
18 would be a significant impact. ~~have a significant impact on shorebirds and waterfowl.~~

19 AMM1-AMM7-~~would minimize these impacts,~~ and implementation of Mitigation Measure BIO-75,
20 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce
21 potential adverse effects of noise, visual disturbance and potential for spills, dust, and
22 sedimentation. ~~the impacts to a less than significant level.~~

23 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
24 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
25 Management, which would provide specific tidal habitat restoration design elements to reduce the
26 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

27 Changes in water operations under CM1 would not be expected to result in increased mercury
28 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
29 exposure of California least tern to methylmercury. There is potential for increased exposure of the
30 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
31 mercury available in the soils and the biogeochemical conditions. However, the concentrations of
32 methylmercury that are harmful varies by species, and the potential for increased exposure varies
33 substantially within the study area. Implementation of CM12 which contains measures to assess the
34 amount of mercury before project development, followed by appropriate design and adaptation
35 management, would minimize the potential for increased methylmercury exposure, and would
36 result in a less-than-significant impact on shorebirds and waterfowl.

37 ~~Tidal habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl species~~
38 ~~through increased exposure to methylmercury, as these species currently nest and forage in tidal~~
39 ~~marshes with elevated methylmercury levels. However, it is unknown what concentrations of~~
40 ~~methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans~~
41 ~~that address the creation and mobilization of mercury, as well as the monitoring and adaptive~~
42 ~~management described in CM12, would be the appropriate place to assess the potential risk of~~
43 ~~shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration~~
44 ~~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.~~

4 Therefore, ~~with AMM1-7, AMM27, and CM 12 in place, in addition to the implementation of~~
5 ~~Mitigation Measure BIO-75,~~ the indirect effects of Alternative 4 implementation would not result in a
6 substantial adverse effect through habitat modification or potential mortality. Therefore, the
7 indirect effects of Alternative 4 implementation would have a less-than-significant impact on ~~have a~~
8 ~~less than significant impact on~~ shorebirds and waterfowl.

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 **Common Wildlife and Plants**

13 Common wildlife and plants are widespread, often abundant, species that are not all covered under
14 laws or regulations that address conservation or protection of individual species. Common wildlife
15 do have some level of protection under California Fish and Game Code and most bird species have
16 protections under the Migratory Bird Treat Act. Examples of common wildlife and plants occurring
17 in the study area are provided within the discussion for each natural community type in Section
18 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts on common wildlife and plants
19 would occur through the same mechanisms discussed for natural communities and special-status
20 wildlife and plants for each alternative.

21 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

22 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are
23 discussed the analysis of Alternative 4 effects on natural communities (Impacts BIO-1 through BIO-
24 31). In general, effects on habitat of common wildlife and plants would not be adverse. Through the
25 course of implementing the Plan over a 50-year time period, several natural communities and land
26 cover types would be reduced in size, primarily from restoration of other natural communities.
27 Grassland, managed wetland and cultivated lands would be reduced in acreage, so the common
28 species that occupy these habitats would be affected. However, the losses in acreage and value of
29 these habitats would be offset by protection, restoration, enhancement, and management actions
30 contained in the BDCP, including *CM3 Natural Communities Protection and Restoration, CM4 Tidal*
31 *Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM6 Channel*
32 *Margin Enhancement, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural*
33 *Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM10*
34 *Nontidal Marsh Restoration, and CM11 Natural Communities Enhancement and Management.* In
35 addition, the AMMs contained in Appendix 3.C. Avoidance and Minimization Measures, of the Draft
36 BDCP, and an updated versions of AMMs 6, 11, 20, 26, and 27 in Appendix D, Substantive BDCP
37 Revisions, of this RDEIR/SDEIS Appendix 3.C of the BDCP would be in place to reduce or eliminate the
38 potential to adversely affect both special-status and common wildlife and plants.

39 Direct effects on common wildlife and plants from constructing water conveyance facilities and
40 implementing BDCP conservation measures would include construction or inundation-related
41 disturbances that result in injury or mortality of wildlife or plants and the immediate displacement
42 of wildlife. Indirect effects include project-related disturbances to nearby wildlife and plants during

1 construction (e.g., disruption of breeding and foraging behaviors from noise and human activity,
2 habitat degradation from fugitive dust and runoff) and effects occurring later in time (e.g., collisions
3 of birds with transmission lines, habitat fragmentation, vegetation management). Indirect effects
4 could result both from construction and from operations and maintenance (e.g., ground
5 disturbances could result in the spread and establishment of invasive plants).

6 **NEPA Effects:** The direct and indirect effects associated with implementing the conservation
7 measures of Alternative 4 would not be adverse because the conservation measures and AMMs also
8 expand and protect natural communities, avoid or minimize effects on special-status species,
9 prevent the introduction and spread of invasive species, and enhance natural communities. These
10 actions would result in avoiding and minimizing effects on common wildlife and plants as well.

11 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat
12 restoration activities would have impacts on common wildlife and plants in the study area through
13 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not
14 be substantial, because habitat restoration would increase the amount and extent of habitat
15 available for use by most common wildlife and plant species. Conservation measures to avoid or
16 minimize effects on special-status species, to prevent the introduction and spread of invasive
17 species, and to enhance natural communities also would result in avoiding and minimizing effects on
18 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any
19 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would
20 be less than significant. No mitigation would be required.

21 **Wildlife Corridors**

22 Essential Connectivity Areas (ECAs) are lands likely to be important to wildlife movement between
23 large, mostly natural areas at the state wide level. The ECAs form a functional network of wildlands
24 that are considered important to the continued support of California's diverse natural communities.
25 Four general areas were identified within the study area that contain ECAs (Figure 12-2). The BDCP
26 also identified important landscape linkages in the Plan Area to guide reserve design, which can also
27 be seen on Figure 12-2.

28 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

29 Alternative 4 water conveyance facilities would cross two of the ECAs identified during the analysis,
30 the Stone Lake-Yolo Bypass ECA and the Mandeville Island-Staten Island ECA. The conveyance
31 facilities would also cross two landscape linkages identified in the BDCP, the *Middle River* linkage
32 (#6 in Figure 12-2) and the *Cosumnes to Stone Lakes* linkage (#10 in Figure 12-2). Though the
33 conveyance facilities shown on Figure 12-2 overlap with the line representing the *Sacramento River*
34 linkage (#9 in Figure 12-2) this line generally represents the course of the Sacramento River and is
35 intended to address the needs of aquatic species and will thus not be addressed in this chapter.

36 The construction of Intakes 2 and 3, the rerouting of Hwy 160, temporary tunnel work areas, and
37 associated borrow and-RTM areas, just east of Clarksburg, would occur within the Stone Lake-Yolo
38 Bypass ECA. These activities would result in the permanent loss of narrow strips of riparian
39 vegetation along the Sacramento River and the permanent and temporary loss of cultivated lands.
40 Alternative 4 would not substantially increase impediments to movement of any nonavian wildlife
41 that could move from Stone Lakes to Yolo Bypass because the Sacramento River and Sacramento
42 River Deep Water Ship Channel already create a barrier to dispersal for nonavian species. However,
43 the conversion of riparian and cultivated lands and the presence of the intakes would locally

1 constrict the north-south movement of nonavian terrestrial species in the area between the
2 Sacramento River and the Southern Pacific Dredger Cut west of Stone Lakes, as well as the east-west
3 movement between Stone Lakes and the east bank of the Sacramento River. No records of wildlife
4 species were identified within these construction footprints, though there are several records for
5 Swainson's hawk in the vicinity. Though there would be losses in Swainson's hawk foraging habitat
6 and potential nesting habitat in these areas, these losses would not substantially impede the
7 movements of Swainson's hawks in the area. The loss in habitat is addressed in the Swainson's hawk
8 effects analysis.

9 The addition of ~~new permanent temporary~~ transmission lines within the Stone Lake-Yolo Bypass
10 ECA and across the *Cosumnes to Stone Lakes* linkage, ~~which would be in place for approximately 7~~
11 ~~years~~, could adversely affect birds during periods of low visibility. Sandhill cranes that are known to
12 roost at Stone Lakes could particularly be adversely affected by the addition of the north-south
13 running transmission line to the west of Stone Lakes and by the east-west transmission line between
14 Stone Lakes and the Cosumnes Preserve; however this line would generally parallel an existing
15 transmission line. The *Cosumnes to Stone Lakes* linkage was developed by BDCP for reserve planning
16 to benefit greater sandhill crane movement from north to south in the Plan Area. Because the
17 proposed east-west transmission line parallels an existing line ~~and would only be in place for~~
18 ~~approximately 7 years~~ it would not likely create a barrier to the future movement of cranes in this
19 area (see impact discussions for greater and lesser sandhill cranes).

20 The Alternative 4 conveyance facilities would also pass through the Mandeville Island-Staten Island
21 ECA, which also has several known roost locations for greater sandhill crane. Within this ECA,
22 Alternative 4 would result in the construction of a ~~temporary reusable tunnel material conveyor~~
23 ~~across Staten Island from north to south, large~~ RTM disposal areas on ~~Staten and~~ Bouldin Islands,
24 permanent access roads on Bouldin and Mandeville Islands, and temporary transmission lines
25 across most of the ECA. As discussed above, the temporary transmission lines could adversely affect
26 the movement of cranes and other bird species during periods of low visibility. The RTM disposal
27 area ~~would not~~ may create a physical barrier to movement ~~for some species and~~ but could make this
28 area unusable as wildlife habitat for ~~at least~~ close to 10 years during the tunnel construction. ~~The~~
29 ~~reusable tunnel material conveyor would create a temporary north-south barrier down the length of~~
30 ~~Staten Island.~~ The access roads are ~~mostly~~ located on existing dirt and paved roads and would
31 therefore not create any new physical barriers but could temporarily increase road mortality during
32 periods of construction. The conveyance alignment at this location would be within the tunnel and
33 thus not create a barrier to wildlife movement.

34 Alternative 4 temporary transmission lines would cross the *Middle River* linkage on Woodward
35 Island. This linkage was established to guide riparian restoration along the Middle River to
36 improve riparian connectivity for the benefit of riparian brush rabbit, riparian woodrat, least Bell's
37 vireo, yellow-breasted chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite. Because
38 this transmission line is temporary it would only temporarily conflict with the future planning for
39 and the current movement of the avian species that use riparian corridors.

40 Alternative 4 conveyance facilities would create some localized disruption in wildlife movement and
41 the temporary and permanent transmission lines would create additional barriers to movement for
42 avian species during periods of low visibility. However, overall the Alternative 4 alignment would
43 not create substantial barriers to movement between ECAs because the majority of the alignment
44 consists of a tunnel that would be beneath riparian corridors, which are the most likely dispersal
45 routes for terrestrial animals in the majority of the study area, and because the large surface impacts

1 (the intakes) are in areas that already have barriers to movement for nonavian terrestrial species
2 (Sacramento River and Sacramento River Deep Water Ship Channel).

3 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
4 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*
5 *Restoration*). These activities would generally improve the movement of wildlife within and outside
6 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and
7 management of these areas (CM11) would improve and maintain wildlife corridors within the study
8 area.

9 **NEPA Effects:** Alternative 4 conveyance facilities would create local barriers to dispersal but overall
10 the restoration activities would improve opportunities for wildlife dispersal within the study area
11 and between areas outside of the study area and therefore overall Alternative 4 would not adversely
12 affect wildlife corridors.

13 **CEQA Conclusion:** Alternative 4 conveyance facilities would create some localized disruption in
14 wildlife movement and the permanent and temporary transmission lines would create additional
15 barriers to movement for avian species during periods of low visibility. However, overall the
16 Alternative 4 alignment would not create substantial barriers to movement between ECAs because
17 the majority of the alignment consists of a tunnel that would be beneath riparian corridors, which
18 are the most likely dispersal routes for terrestrial animals in the majority of the study area, and
19 because the large surface impacts, (the intakes) are in areas that already have barriers to movement
20 for nonavian terrestrial species (Sacramento River and Sacramento River Deep Water Ship Channel).

21 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
22 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Community*
23 *Communities Restoration*). These activities would generally improve the movement of wildlife within
24 and outside of the Plan Area. In addition, the preservation of restored lands (CM3) and the
25 enhancement and management of these areas (CM11) would improve and maintain wildlife
26 corridors within the study area.

27 Alternative 4 conveyance facilities would create local barriers to dispersal and create barriers to
28 safe movement of avian species during periods of low visibility but overall the restoration activities
29 would improve opportunities for wildlife dispersal within the study area and between areas outside
30 of the study area and therefore overall Alternative 4 would result in less-than-significant impacts on
31 wildlife corridors.

32 **Invasive Plant Species**

33 The invasive plant species that primarily affect each natural community in the study area, which
34 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed
35 in Section 12.1.4. Invasive species compete with native species for resources and can alter natural
36 communities by altering fire regimes, hydrology (e.g., sedimentation and erosion), light availability,
37 nutrient cycling, and soil chemistry but also have the potential to harm human health and the
38 economy by adversely affecting natural ecosystems, water delivery, flood protection systems,
39 recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The construction
40 and restoration activities covered under the BDCP could result in the introduction or spread of
41 invasive plant species by creating temporary ground disturbance that provides opportunities for
42 colonization by invasive plants in the study area.

1 The primary mechanisms for the introduction of invasive plants as the result of implementation of
2 the BDCP are listed here.

- 3 • Grading, excavation, grubbing, and placement of fill material.
- 4 • Breaching, modification, or removal of existing levees and construction of new levees.
- 5 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
6 electric transmission and gas lines, irrigation infrastructure).
- 7 • Maintenance of infrastructure.
- 8 • Removal of existing vegetation and planting/seeding of vegetation.
- 9 • Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 10 • Dredging waterways.

11 Clearing operations and the movement of vehicles, equipment, and construction materials in the
12 study area would facilitate the introduction and spread of invasive plants by bringing in or moving
13 seeds and other propagules. These effects would result from four activities.

- 14 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork
15 operations are complete.
- 16 • Importing, distributing, storing, or disposing of fill, reusable tunnel material, borrow, spoil, or
17 dredge material.
- 18 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of
19 construction staff.
- 20 • Transport of construction materials and equipment within the study area and to/from the study
21 area.

22 Table 12-4-70 lists the acreages of temporary disturbance in each natural community in the study
23 area that would result from implementation of Alternative 4.

1 **Table 12-4-70. Summary of Temporary Disturbance in Natural Communities under Alternative 4**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	2,11 46
Tidal brackish emergent wetland	0
Tidal freshwater emergent wetland	1 61
Valley foothill riparian	15 42
Grassland	4 2431
Inland dune scrub	0
Alkali seasonal wetland complex	03
Vernal pool complex	316
Other natural seasonal wetland	0
Nontidal freshwater perennial emergent wetland	76
Nontidal perennial aquatic	3 84
Managed wetlands	7 32
Cultivated lands	2,896 753
Total	5,649594

2

3 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**
 4 **and Spread of Invasive Plant Species**

5 Under Alternative 4, the BDCP would have adverse effects on natural communities as a result of the
 6 introduction and spread of invasive plant species through implementation of CM1–CM10 and ~~CM22~~
 7 ~~(AMM6)~~. No adverse effects are expected from implementation of CM11–CM21.

- 8 • *CM1 Water Facilities and Operations*: Construction of the Alternative 4 water conveyance
 9 facilities would result in the temporary disturbance of 3,531~~752~~ acres that would provide
 10 opportunities for colonization by invasive plant species.
- 11 • *CM2 Yolo Bypass Fisheries Enhancements*: Construction of the Yolo Bypass fisheries
 12 enhancements would result in the temporary disturbance of 758 acres that would provide
 13 opportunities for colonization by invasive plant species. Vegetation maintenance activities for
 14 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;
 15 however, the clearing of linear areas to facilitate water flow may also result in increased
 16 opportunities for invasion. Sediment removal, transportation, and application as a source
 17 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance
 18 activities could also result in the spread of invasives if the sediment contains viable invasive
 19 plant propagules.
- 20 • *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural
 21 communities located in the eleven CZs would result in the temporary disturbance of restoration
 22 areas that would provide opportunities for colonization by invasive plant species.
- 23 • *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of
 24 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish
 25 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would
 26 provide opportunities for colonization by invasive plant species. These adverse effects would be
 27 reduced by designing restoration projects to minimize the establishment of nonnative

1 submerged aquatic vegetation, and early restoration projects would be monitored to assess the
2 response of nonnative species to restoration designs and local environmental conditions. If
3 indicated by monitoring results, the BDCP Implementation Office would implement invasive
4 plant control measures in restored natural communities to help ensure the establishment of
5 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively
6 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural
7 community restoration sites.

- 8 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
9 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and
10 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for
11 colonization by invasive plant species.
- 12 • *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were
13 not estimated because specific locations for this activity and their areal extent have not been
14 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut
15 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and
16 salmonid migration channels in the interior Delta) would result in the temporary disturbance of
17 channel areas that would provide opportunities for colonization by invasive plant species.
- 18 • *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat
19 would result in the temporary disturbance of riparian areas that would provide opportunities
20 for colonization by invasive plant species.
- 21 • *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZs 1, 8,
22 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land
23 that would provide opportunities for colonization by invasive plant species.
- 24 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: The restoration of vernal pool
25 and alkali seasonal wetland complexes in CZs 1, 8, or 11 would result in the temporary
26 disturbance of grassland areas that would provide opportunities for colonization by invasive
27 plant species.
- 28 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through
29 conversion of agricultural lands in CZs 2 and 4, would result in the temporary disturbance of
30 fallow agricultural areas that would provide opportunities for colonization by invasive plant
31 species. These adverse effects would be reduced by monitoring the development of marsh
32 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the
33 establishment of native marsh vegetation or if restoration success could be improved with
34 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation
35 control measures and supplemental plantings would be implemented.
- 36 • ~~CM22~~ *Avoidance and Minimization Measures: AMM6 Spoils, Reusable Tunnel Material, and*
37 *Dredged Material Disposal Plan* would have adverse effects if spoils, RTM, dredged material, or
38 chipped vegetative materials containing viable invasive plant propagules are used as topsoil in
39 uninfested areas.

40 The adverse effects that would result from the introduction and spread of invasive plants through
41 colonization of temporarily disturbed areas would be minimized by implementation of CM11,
42 AMM4, AMM10, and AMM11.

1 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by
2 implementing invasive plant control within the BDCP reserve system to reduce competition on
3 native species, thereby improving conditions for covered species, ecosystem function, and native
4 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy
5 to control or the most ecologically damaging nonnative plants for which effective suppression
6 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,
7 perennial pepperweed, barbgrass, and rabbitsfoot grass would be controlled (and tidal mudflats
8 would be maintained). In riparian areas, invasive plant control would focus on reducing or
9 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In
10 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the
11 cover of invasive plant species.

12 Implementation of AMM4, AMM10, and AMM11 would also reduce the adverse effects that could
13 result from construction activities. The AMMs provide methods to minimize ground disturbance,
14 guidance for developing restoration and monitoring plans for temporary construction effects, and
15 measures to minimize the introduction and spread of invasive plants. AMM4 would involve the
16 preparation and implementation of an erosion and sediment control plan that would control erosion
17 and sedimentation and restore soils and vegetation in affected areas. The restoration and
18 monitoring plans for implementation of AMM10 would involve methods for stockpiling, storing, and
19 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive
20 management strategies, reporting requirements, and success criteria. AMM10 would also include
21 planting native species appropriate for the natural community being restored, with the exception of
22 some borrow sites in cultivated lands that would be restored as grasslands.

23 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed
24 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas
25 to be cleared do contain invasive plants, then chipped vegetation material from those areas would
26 not be used for erosion control but would be disposed of to minimize the spread of invasive plant
27 propagules (e.g., burning, composting). During construction of the water conveyance facilities and
28 construction activities associated with the other CMs, construction vehicles and construction
29 machinery would be cleaned prior to entering construction sites that are in or adjacent natural
30 communities other than cultivated lands and prior to entering any BDCP restoration sites or
31 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads
32 through areas with infestations of invasive plant species would be cleaned before travelling to other
33 parts of the Plan Area. Cleaning stations would be established at the perimeter of BDCP covered
34 activities along construction routes as well as at the entrance to reserve system lands. Biological
35 monitoring would include locating and mapping locations of invasive plant species within the
36 construction areas during the construction phase and the restoration phase. Infestations of invasive
37 plant species would be targeted for control or eradication as part of the restoration and revegetation
38 of temporarily disturbed construction areas.

39 **NEPA Effects:** The implementation of AMM4, AMM10, and AMM11, and CM11 would reduce the
40 potential for the introduction and spread of invasive plants and avoid or minimize the potential
41 effects on natural communities and special-status species; therefore, these effects would not be
42 adverse.

43 **CEQA Conclusion:** Under Alternative 4, impacts on natural communities from the introduction or
44 spread of invasive plants as a result of implementing the BDCP would not result in the long-term
45 degradation of a sensitive natural community. With implementation of AMM4, AMM10, AMM11 and

1 CM11, the temporary disturbance of land associated with the alternative would be offset and would
2 not result in ~~due to~~ substantial alteration of site conditions. ~~T and would, t~~ therefore, the impact
3 would be considered less than significant. No mitigation would be required.

4 **Compatibility with Plans and Policies**

5 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 6 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 7 **Addressing Terrestrial Biological Resources in the Study Area**

8 Constructing the water conveyance facilities (CM1) and implementing CM2–CM2~~2~~1 for Alternative 4
9 have the potential for being incompatible with plans and policies related to managing and protecting
10 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and
11 executive orders that are relevant to actions in the study area provide guidance for terrestrial
12 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan
13 and policy compatibility evaluates whether Alternative 4 would be compatible or incompatible with
14 such enactments, rather than whether impacts would be adverse or not adverse, or significant or
15 less than significant. If the incompatibility relates to an applicable plan, policy, or executive order
16 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be
17 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such
18 physical effects of Alternative 4 on terrestrial biological resources are addressed in the impacts on
19 natural communities and species. The following is a summary of compatibility evaluations related to
20 terrestrial biological resources for laws, plans, policies, and executive orders relevant to the BDCP.

21 **Federal and State Legislation**

- 22 • The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,
23 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain
24 legal guidance that either directly or indirectly promotes or stipulates the protection and
25 conservation of terrestrial biological resources in the process of undertaking activities that
26 involve federal decisionmaking. The biological goals and objectives contained in the BDCP that
27 provide the major guidance for implementing the various conservation elements of Alternative
28 4 are all designed to promote the long-term viability of the natural communities, special-status
29 species, and common species that inhabit the Plan Area. While some of the conservation
30 measures of the alternative involve permanent and temporary loss of natural communities and
31 associated habitats during facilities construction and expansion of certain natural communities,
32 the long-term guidance in the Plan would provide for the long-term viability and expansion of
33 the habitats and special-status species populations in the Plan Area. Alternative 4 conservation
34 actions would be compatible with the policies and directives for terrestrial biological resources
35 contained in these federal laws.
- 36 • The *California Endangered Species Act*, *California Native Plant Protection Act*, *Porter-Cologne*
37 *Water Quality Control Act*, and *Natural Communities Conservation Planning Act* are state laws
38 that have relevance to the management and protection of terrestrial biological resources in the
39 study area. Each of these laws promotes consideration of wildlife and native vegetation either
40 through comprehensive planning or through regulation of activities that may have an adverse
41 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis
42 for Alternative 4, contains biological goals and objectives that have been developed to promote
43 the species protection and natural resource conservation that are directed by these state laws.

1 Alternative 4 conservation actions would be compatible with the policies and directives
2 contained in these laws.

- 3 • The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the
4 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the
5 maintenance and protection of natural resources and the protection of agricultural land uses in
6 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use
7 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state
8 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of
9 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological
10 goals and objectives would be compatible with these LURMP goals (Delta Protection
11 Commission 2010).
- 12 • The *Suisun Marsh Preservation Act of 1974* was designed to protect the Suisun Marsh for long-
13 term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of
14 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration
15 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh
16 Preservation Act.

17 **Plans, Programs, and Policies**

- 18 • *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the
19 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:
20 provide for a more reliable water supply for California and protect, restore, and enhance the
21 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances
22 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an
23 evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta
24 Stewardship Council will determine whether the BDCP is compatible with the goals and
25 objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the
26 BDCP with the Delta Plan is considered in detail in [Chapter 13](#), Section 13.2.2.2, [The Delta Plan of](#)
27 [Chapter 13, Land Use of the Draft EIR/EIS](#).
- 28 • *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,
29 promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and
30 values in California. The BDCP conservation measures that provide for a significant expansion of
31 wetland acreage and quality in the Delta and Suisun Marsh are compatible with the intent of the
32 California Wetlands Conservation Policy.
- 33 • *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*
34 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the
35 major basins of California's Central Valley. The NAWMP is a management plan jointly approved
36 by the United States and Canada in 1986. It contains general guidance from the principal wildlife
37 management agencies of the two countries for sustaining abundant waterfowl populations by
38 conserving landscapes through self-directed partnerships (joint ventures) that are guided by
39 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation
40 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal
41 government agencies, and one corporation that have formed a partnership to improve the
42 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding
43 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's
44 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation

1 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP
2 Plan Area includes all or portions of three Implementation Plan basins— the Delta, Yolo and
3 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland
4 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and
5 water supplies for wetland management, agricultural land enhancement, farmland easements
6 that maintain waterfowl food resources on agricultural land, and farmland easements that
7 buffer existing wetlands from urban and residential growth.

8 Implementation of the Alternative 4 conservation measures would result in significant
9 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;
10 however, significant increases in tidal and nontidal wetlands in these basins would be another
11 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has
12 included a large managed wetland conservation and enhancement goal for this area. For the
13 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this
14 EIR/EIS has added mitigation that would require food production studies and adaptive
15 management to ensure that the Suisun basin would continue to provide the waterfowl and
16 shorebird habitat envisioned in the Implementation Plan.

- 17 ● *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*
18 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*
19 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*
20 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to
21 preserve and enhance the natural resource and recreation qualities of these areas.
22 Implementing Alternative 4, especially construction of CM1 and CM2 facilities, and land
23 modification associated with CM4 restoration activities, could create temporary disruptions to
24 the terrestrial biological resource management activities in these management areas. The
25 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the
26 BDCP would be compatible with the long-term management goals of these areas. Proposed
27 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed
28 to be compatible with and to complement the current management direction for these areas and
29 would be required to adapt restoration proposals to meet current policy established for
30 managing these areas.
- 31 ● *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the
32 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term
33 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh
34 Preservation Act. The Suisun Marsh Preservation Agreement (SMPA) was signed in 1987 and
35 modified in 2005 by DWR, CDFW, Reclamation and the Suisun Resource Conservation District to
36 establish the mitigation approach in the Marsh for effects of operating the SWP and CVP. The
37 primary concerns were the effects of CVP and SWP Delta diversions on salinity in the Marsh. The
38 SMPA focused on ways to ensure adequate water quality and quantity for the managed wetlands
39 and wildlife habitats in the Marsh to assure equal waterfowl values in the Marsh. The Suisun
40 Marsh Plan (SMP), for which a Final EIS/EIR was released in 2010 by these agencies, provides
41 for restoration of tidal marsh habitat and enhancement of managed wetland in the Marsh,
42 maintenance of waterfowl hunting and recreational opportunities in the Marsh, maintenance
43 and improvement of the Marsh levee system, and protection and enhancement of water quality
44 for beneficial uses of the Marsh. An integral component of the SMP is balancing continued
45 managed wetland operation with new tidal wetland restoration to provide improved and
46 greater habitat for fish and wildlife species. The SMP is a programmatic, long-term plan and

1 does not include specific projects, project proponents, or funding mechanisms. However, the
2 SMP relies on tidal restoration to allow for managed wetland operations to continue. The BDCP
3 would provide a funding mechanism and increased management potential relative to existing
4 and restored habitats, assisting the SMP in meeting its broader ecological goals, consistent with
5 long-term operation of the SWP and CVP water conveyance facilities. The conservation actions
6 contained in the BDCP, which are designed to ensure the long-term protection and recovery of
7 special-status fish and wildlife species dependent on the Marsh, would be compatible with the
8 water quality and habitat restoration goals of the SMPA and SMP.

- 9 • *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive
10 species. Implementation of the Plan's long-term control and management objectives affect
11 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan
12 objectives are to control and remove invasive aquatic species that are detrimental to native
13 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be
14 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative
15 4 would, therefore, be compatible with the objectives of the California Aquatic Invasive Species
16 Management Plan.
- 17 • *Habitat Conservation Plans and Natural Community Conservation Plans* are the subject of a
18 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP
19 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

20 **Executive Orders**

- 21 • *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland
22 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the
23 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 24 • *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the
25 introduction and spread of invasive species in a cost-effective and environmentally sound
26 manner. Alternative 4 construction and restoration actions have the potential to both introduce
27 and spread invasive species in the study area. Implementation of mitigation measures described
28 in this chapter would be capable of making Alternative 4 implementation compatible with
29 Executive Order 13112.
- 30 • *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs
31 federal agencies whose activities affect public land management, outdoor recreation, and
32 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and
33 the management of game species and their habitat. Alternative 4 conservation measures that
34 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and
35 other natural communities would conflict with the hunting expansion and enhancement aspects
36 of this executive order. Refer to Chapter 15, *Recreation*, of the Draft EIR/EIS for a detailed
37 analysis of the effects of alternatives on hunting opportunities. The habitat protection and
38 expansion conservation measures of Alternative 4 would be compatible with the executive
39 order's goal of facilitating the management of habitats for some game species.

40 **NEPA Effects: The potential plan and policy incompatibilities of implementing Alternative 4**
41 **identified in the analysis above indicate the potential for a physical consequence to the environment.**
42 **The primary physical consequence of concern is the conversion of cultivated land and managed**
43 **wetland to natural wetland and riparian habitat in the study area. The physical effects are discussed**
44 **in the Shorebirds and Waterfowl analysis above, and no additional NEPA effects determination is**

1 required related to the compatibility of the alternative with relevant plans and polices. The reader is
2 referred to Chapter 13, Section 13.2, *Regulatory Setting*, of the Draft EIR/EIS for a further discussion
3 of the responsibilities of state and federal agencies to comply with local regulations, and a
4 discussion of the relationship between plan and policy consistency and physical consequences to the
5 environment.

6 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 4
7 identified in the analysis above indicate the potential for a physical consequence to the environment.
8 The primary physical consequence of concern is the conversion of large acreages of cultivated land
9 and managed wetland to natural wetland and riparian habitat in the study area. The physical effects
10 are discussed in the Shorebirds and Waterfowl analysis above, and no additional CEQA conclusion is
11 required related to the compatibility of the alternative with relevant plans and polices. The reader is
12 referred to Chapter 13, Section 13.2.3 of Chapter 13, *Land Use Local and Regional Plans, Policies, and*
13 *Regulations, of the Draft EIR/EIS* for a further discussion of the responsibilities of state and federal
14 agencies to comply with local regulations, and a discussion of the relationship between plan and
15 policy consistency and physical consequences to the environment.

1 **12.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and**
2 **Intake 1 (3,000 cfs; Operational Scenario C)**

3 **Comparative Differences in CM1 Construction Effects for Alternatives 5 and 1A**

4 With only one intake and pump station located in the north Delta, Alternative 5 would create
5 significant differences in the permanent and temporary loss of natural communities and cultivated
6 lands during water conveyance facilities construction when compared with alternatives having five
7 intakes along the Sacramento River (Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 6A, 6B, and 6C). The relative
8 differences in direct loss of habitat between Alternative 5 and Alternative 1A are included in Table
9 12-5-1. All of these differences would occur during the near-term timeframe associated with water
10 conveyance facilities construction along and just east of the Sacramento River between Clarksburg
11 and Courtland. Alternative 5 would permanently remove 13 fewer acres of tidal perennial aquatic
12 habitat in the Sacramento River, 12 fewer acres of valley/foothill riparian habitat along the eastern
13 bank of the Sacramento River, 21 fewer acres of grassland along and behind the levees of the river,
14 and 166 fewer acres of cultivated land immediately east of the river (Table 12-5-1). Alternative 5
15 would also permanently affect a smaller acreage of ~~potential~~ jurisdictional waters (including
16 wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (~~15-14~~ acres
17 fewer; [see Table 12-5-2](#)). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and
18 temporary impacts on jurisdictional waters and wetlands.

19 Alternative 5 also would result in significantly fewer temporary losses of natural communities,
20 including reduced losses of tidal perennial aquatic (49 acres less), valley/foothill riparian (11 acres
21 less), grassland (27 acres less), tidal freshwater emergent wetland (3 acres less), and cultivated
22 lands (461 acres less) when compared with Alternative 1A (Table 12-5-1). Alternative 5 would
23 temporarily affect a smaller acreage of ~~potential~~ jurisdictional waters (including wetlands) as
24 regulated by Section 404 of the CWA, when compared to Alternative 1A (57 acres fewer; [see Table](#)
25 [12-5-2](#)). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary
26 jurisdictional waters and wetlands impacts.

27 **Effects of Restoration-Related Conservation Actions of Alternative 5**

28 **NEPA Effects:** Alternative 5 would not have adverse effects on the terrestrial natural communities,
29 special-status species and common species that occupy the study area. The alternative also would
30 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
31 species, ~~result in a net loss of wetlands and other waters of the United States,~~ reduce the value of
32 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As
33 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's
34 conservation actions, including the construction of water conveyance tunnels from the north Delta
35 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its
36 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently
37 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian
38 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities
39 in the study area would have beneficial effects on covered and noncovered species. Where
40 conservation actions would not fully offset effects, the Plan has developed AMMs and this document
41 has included additional mitigation measures to avoid adverse effects. Alternative 5 would not
42 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

1 **CEQA Conclusion:** Alternative 5 would not have significant and unavoidable impacts on the
2 terrestrial natural communities, special-status species and common species that occupy the study
3 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
4 risk of introducing invasive species, ~~result in a net loss of wetlands and other waters of the United~~
5 ~~States~~, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
6 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
7 converted by the Plan's conservation actions, including the construction of water conveyance
8 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
9 habitat would be restored to its pre-project condition and the restoration conservation measures
10 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal
11 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
12 sensitive natural communities in the study area would have beneficial effects on covered,
13 noncovered, and common species. Where conservation actions would not fully offset impacts, the
14 Plan has developed AMMs and this document has included additional mitigation measures to avoid
15 significant impacts. Alternative 5 would not require mitigation measures beyond what is proposed
16 for Alternative 1A to offset effects.

17 As with Alternative 1A, Alternative 5 would require several mitigation measures to be adopted to
18 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
19 measures would be needed beyond the impact offsets provided by Alternative 5 AMMs and CM2–
20 ~~CM22–CM21~~ conservation actions. The relevant mitigation measures, which are included in detail in
21 the analysis of Alternative 1A, are as follows:

- 22 • [Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.](#)

23 **12.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2,** 24 **3, and 5, and Enhanced Aquatic Conservation (9,000 cfs;** 25 **Operational Scenario E)**

26 **Comparative Differences in CM1 Construction Effects for Alternatives 7 and 1A**

27 Because of the elimination of Intakes 1 and 4 and their associated pumps and pipelines, Alternative
28 7 would create relatively small differences in the permanent and temporary loss of natural
29 communities and cultivated lands during water conveyance facilities construction when compared
30 with Alternative 1A (Table 12-7-1). All of these differences would occur during the near-term
31 timeframe associated with water conveyance facilities construction. Alternative 7 would
32 permanently remove 7 fewer acres of tidal perennial aquatic habitat in the Sacramento River, 10
33 fewer acres of valley/foothill riparian habitat along the eastern bank of the Sacramento River, and 5
34 fewer acres of grassland along the river levees. These reductions would occur as a result of not
35 constructing Intakes 1 and 4 on the east bank of the Sacramento River. There would also be a
36 reduction in loss of cultivated lands (95 fewer acres) east of the river near these intake sites.
37 Alternative 7 would also permanently affect a smaller acreage of ~~potential~~ jurisdictional waters
38 (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (7
39 acres fewer; [see Table 12-7-2](#)). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent
40 and temporary jurisdictional waters and wetlands impacts.

1 **Table 12-7-2 Alternative 7 Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1A**
2 **(acres)**

Wetland/Water Type	Alternative 7 Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1A	Temporary Impact	Difference from Alternative 1A
Agricultural Ditch	64.6	-0.3	21.9	-1.6
Alkaline Wetland	0.1	0	0	0
Clifton Court Forebay	1.0	0	0	0
Conveyance Channel	12.7	0	1.1	0
Depression	1.9	0	0.4	-1.3
Emergent Wetland	46.8	0	6.7	-0.6
Forest	5.6	-0.1	10.8	-1.1
Lake	0	0	0.3	0
Scrub-Shrub	20.3	-0.3	3.3	-1.0
Seasonal Wetland	18.7	0	26.6	0
Tidal Channel	36.9	-6.1	109.6	-24.2
Vernal Pool	0	0	0	0
Total	209	-6.8	181	-29.8

3
4 During the water conveyance facilities construction process, Alternative 7 would also involve less
5 temporary loss of habitat when compared with Alternative 1A. The difference would be reflected in
6 reduced losses of tidal perennial aquatic (25 acres less), valley/foothill riparian (3 acres less),
7 grassland (7 acres less), and cultivated land (214 acres less) when compared with Alternative 1A
8 (Table 12-7-1). Alternative 7 would also temporarily affect a smaller acreage of **potential**
9 jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared
10 to Alternative 1A (**29-30** acres fewer; **see Table 12-7-2**). Refer to Table 12-1A-69 for a summary of
11 Alternative 1A permanent and temporary jurisdictional waters and wetlands impacts.

12 **NEPA Effects:** Alternative 7 would not have adverse effects on the terrestrial natural communities,
13 special-status species and common species that occupy the study area. The alternative also would
14 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
15 species, ~~result in a net loss of wetlands and other waters of the United States~~, reduce the value of
16 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As
17 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's
18 conservation actions, including the construction of water conveyance tunnels from the north Delta
19 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its
20 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently
21 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian
22 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities
23 in the study area would have beneficial effects on covered and noncovered species. Where
24 conservation actions would not fully offset effects, the Plan has developed AMMs and this document
25 has included additional mitigation measures to avoid adverse effects. Alternative 7 would not
26 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

27 **CEQA Conclusion:** Alternative 7 would not have significant and unavoidable impacts on the
28 terrestrial natural communities, special-status species and common species that occupy the study

1 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
2 risk of introducing invasive species, ~~result in a net loss of wetlands and other waters of the United~~
3 ~~States~~, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
4 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
5 converted by the Plan's conservation actions, including the construction of water conveyance
6 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
7 habitat would be restored to its pre-project condition and the restoration conservation measures
8 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal
9 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
10 sensitive natural communities in the study area would have beneficial effects on covered,
11 noncovered, and common species. Where conservation actions would not fully offset impacts, the
12 Plan has developed AMMs and this document has included additional mitigation measures to avoid
13 significant impacts. Alternative 7 would not require mitigation measures beyond what is proposed
14 for Alternative 1A to offset effects.

15 As with Alternative 1A, Alternative 7 would require several mitigation measures to be adopted to
16 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
17 measures would be needed beyond the impact offsets provided by Alternative 7 AMMs and CM2–
18 ~~CM22-CM21~~ conservation actions. The relevant mitigation measures, which are included in detail in
19 the analysis of Alternative 1A, are as follows:

- 20 • [Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.](#)

21 **12.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,** 22 **3, and 5 and Increased Delta Outflow (9,000 cfs; Operational** 23 **Scenario F)**

24 **Comparative Differences in CM1 Construction Effects for Alternatives 8 and 1A**

25 Because of the elimination of Intakes 1 and 4 and their associated pumps and pipelines, Alternative
26 8 would create relatively small differences in the permanent and temporary loss of natural
27 communities and cultivated land during water conveyance facilities construction when compared
28 with Alternative 1A (Table 12-8-1). All of these differences would take place during the near-term
29 timeframe associated with water conveyance facilities construction. Alternative 8 would
30 permanently remove 7 fewer acres of tidal perennial aquatic habitat, 10 fewer acres of
31 valley/foothill riparian habitat, and 5 fewer acres of grassland along the east bank of the Sacramento
32 River. Alternative 8 would also remove 95 fewer acres of cultivated land east of the Sacramento
33 River. Alternative 8 would also permanently affect a smaller acreage of ~~potential~~ jurisdictional
34 waters (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative
35 1A (7 acres fewer; [see Table 12-8-2](#)). Refer to Table 12-1A-69 for a summary of Alternative 1A
36 permanent and temporary jurisdictional waters and wetlands impacts.

37 During the water conveyance facilities construction process, Alternative 8 would involve less
38 temporary loss of habitat when compared with Alternative 1A. There would be reduced losses of
39 tidal perennial aquatic (25 acres less), tidal freshwater emergent wetland (1 acre less),
40 valley/foothill riparian (3 acres less), grassland (7 acres less) and cultivated land (214 acres less)
41 when compared with Alternative 1A (Table 12-8-1). Alternative 8 would also temporarily affect a
42 smaller acreage of ~~potential~~ jurisdictional waters (including wetlands) as regulated by Section 404
43 of the CWA, when compared to Alternative 1A (~~29-30~~ acres fewer; [see Table 12-8-2](#)). Refer to Table

1 12-1A-69 for a summary of Alternative 1A permanent and temporary jurisdictional waters and
2 wetlands impacts.

3 **Table 12-8-2 Alternative 8 Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1A**
4 **(acres)**

<u>Wetland/Water Type</u>	<u>Alternative 8 Impacts on Jurisdictional Wetlands and Waters</u>			
	<u>Permanent Impact</u>	<u>Difference from Alternative 1A</u>	<u>Temporary Impact</u>	<u>Difference from Alternative 1A</u>
<u>Agricultural Ditch</u>	<u>64.6</u>	<u>-0.3</u>	<u>21.9</u>	<u>-1.6</u>
<u>Alkaline Wetland</u>	<u>0.1</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Clifton Court Forebay</u>	<u>1.0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Conveyance Channel</u>	<u>12.7</u>	<u>0</u>	<u>1.1</u>	<u>0</u>
<u>Depression</u>	<u>1.9</u>	<u>0</u>	<u>0.4</u>	<u>-1.3</u>
<u>Emergent Wetland</u>	<u>46.8</u>	<u>0</u>	<u>6.7</u>	<u>-0.6</u>
<u>Forest</u>	<u>5.6</u>	<u>-0.1</u>	<u>10.8</u>	<u>-1.1</u>
<u>Lake</u>	<u>0</u>	<u>0</u>	<u>0.3</u>	<u>0</u>
<u>Scrub-Shrub</u>	<u>20.3</u>	<u>-0.3</u>	<u>3.3</u>	<u>-1.0</u>
<u>Seasonal Wetland</u>	<u>18.7</u>	<u>0</u>	<u>26.6</u>	<u>0</u>
<u>Tidal Channel</u>	<u>36.9</u>	<u>-6.1</u>	<u>109.6</u>	<u>-24.2</u>
<u>Vernal Pool</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Total</u>	<u>209</u>	<u>-6.8</u>	<u>181</u>	<u>-29.8</u>

5
6 **NEPA Effects:** Alternative 8 would not have adverse effects on the terrestrial natural communities,
7 special-status species and common species that occupy the study area. The alternative also would
8 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
9 species, ~~result in a net loss of wetlands and other waters of the United States,~~ reduce the value of
10 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As
11 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's
12 conservation actions, including the construction of water conveyance tunnels from the north Delta
13 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its
14 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently
15 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian
16 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities
17 in the study area would have beneficial effects on covered and noncovered species. Where
18 conservation actions would not fully offset effects, the Plan has developed AMMs and this document
19 has included additional mitigation measures to avoid adverse effects. Alternative 8 would not
20 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

21 **CEQA Conclusion:** Alternative 8 would not have significant and unavoidable impacts on the
22 terrestrial natural communities, special-status species and common species that occupy the study
23 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
24 risk of introducing invasive species, ~~result in a net loss of wetlands and other waters of the US,~~
25 reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies that
26 affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
27 converted by the Plan's conservation actions, including the construction of water conveyance

1 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
2 habitat would be restored to its pre-project condition and the restoration conservation measures
3 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal
4 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
5 sensitive natural communities in the study area would have beneficial effects on covered,
6 noncovered, and common species. Where conservation actions would not fully offset impacts, the
7 Plan has developed AMMs and this document has included additional mitigation measures to avoid
8 significant impacts. Alternative 8 would not require mitigation measures beyond what is proposed
9 for Alternative 1A to offset effects.

10 As with Alternative 1A, Alternative 8 would require several mitigation measures to be adopted to
11 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
12 measures would be needed beyond the impact offsets provided by Alternative 8 AMMs and CM2–
13 [CM22-CM21](#) conservation actions. The relevant mitigation measures, which are included in detail in
14 the analysis of Alternative 1A, are as follows:

- 15 • [Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.](#)
16

1 **12.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs;**
2 **Operational Scenario G)**

3 **General Terrestrial Biology Effects**

4 **Wetlands and Other Waters of the United States**

5 Alternative 9 actions would both permanently and temporarily remove or convert wetlands and
6 open water that ~~is potentially jurisdictional as are~~ regulated by USACE under Section 404 of the
7 CWA. The 404 regulations and relevant information on mitigation the effects of impact to wetlands
8 and waters of the United States (U.S.) are described in Section 12.2.1.1 in Appendix A, Draft EIR/EIS
9 In-Text Chapter Revisions, of this RDEIR/SDEIS. The following two impacts address the project-level
10 effects of CM1 on these potential wetlands and waters, and the programmatic-level effects of other
11 relevant conservation actions (CM2–CM10). ~~Conservation Measures CM11–22–CM21~~ would not
12 directly result in loss or conversion of wetlands or other waters of the ~~United States~~U.S. The
13 methods used to conduct these analyses are described in Section 12.3.2.4 in Appendix A, Draft
14 EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS. The waters of the U.S. data used for this
15 analysis is based on a verified wetland delineation from the USACE that was completed in early
16 2015. These waters of the U.S. were mapped at finer scale than that which was done for the natural
17 community mapping for the BDCP and therefor the acreages of these two datasets differ when
18 compared to each other. The waters of the U.S. mapping identified numerous agricultural ditches
19 and seasonal wetlands occurring within and associated with cultivated lands, which explains the
20 majority of the difference.~~of this chapter.~~

21 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**
22 **Other Waters of the United States**

23 Alternative 9 proposes the construction, maintenance, and operation of water conveyance facilities
24 within, or requiring the unavoidable fill of, waters of the U.S. The estimated fill of jurisdictional
25 waters associated with this alternative is described in Table 12-9-69 below.~~Construction of the~~
26 ~~Alternative 9 water conveyance facilities would both temporarily and permanently remove potential~~
27 ~~wetlands and other waters of the United States as regulated by Section 404 of the CWA (Table 12-9-~~
28 ~~69).~~ Based on the methodology used to conduct this analysis, these effects would occur at channel
29 dredging sites, canal construction sites, operable barrier construction sites and channel widening
30 sites throughout the study area, and at multiple temporary work areas associated with the
31 construction activity. The permanent and temporary wetland effects ~~(1,565 acres)~~ would occur
32 primarily in open tidally-influenced channels of the central and south Delta, including Middle River,
33 Victoria Canal and Old River from channel dredging and canal construction. Construction of various
34 operable barriers in major rivers, canals and sloughs throughout the central and south Delta would
35 also contribute to the large acreage affected by water conveyance construction. Most of the
36 construction and dredging activities would not permanently remove the waterways, but would
37 permanently modify the channel bottoms and eliminate any associated aquatic vegetation. An
38 additional effect on waters of the ~~United States~~U.S. is the dredging of 517 acres of tidal flow in
39 Middle River and Victoria and North Canals.

1 **Table 12-9-69. Estimated Fill of Waters of the U.S. Associated with the Construction of Water**
 2 **Conveyance Facilities under Alternative 9 (acres)**~~Potential Wetlands and Other Waters of the United~~
 3 **States Filled by Construction of Alternative 9 Water Conveyance Facilities**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as Permanent ¹	Temporary Impact ²	Total Impact
Agricultural Ditch	36.4	8.0	1.0	45.3
Alkaline Wetland	0	0	0	0
Clifton Court Forebay	13.2	0	0	13.2
Conveyance Channel	0.4	0	0	0.4
Depression	4.9	0.1	0	4.9
Emergent Wetland	54.1	9.0	165.0	64.0
Forest	23.5	14.0	60.0	38.0
Lake	0	0	0	0
Scrub-Shrub	5.2	4.0	42.0	9.0
Seasonal Wetland	91.6	28.6		120.2
Tidal Channel	687.0	24.0	401.0	712.0
Vernal Pool	0	0	0	0
Total	916	88	669	1,674

4

Wetland/Other Water Type ^a	Permanent	Temporary	Total
Open Water			
Nontidal Flow	41	10	51
Muted Tidal Flow	0	0	0
Tidal Flow ^b	670	362	1,032
Pond or Lake (nontidal)	5	<1	5
Clifton Court Forebay	13	0	13
Wetland			
Nontidal Wetland	17	21	38
Tidal Wetland	74	332	406
Seasonal Wetland	12	8	20
Total Impact Acres	832	733	1,565

^a—Wetland types are described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*.

^b—Alternative 9 also includes channel dredging impacts on 517 acres of tidal flow in Middle River and Victoria and North Canals

Source: California Department of Water Resources 2013b

5

¹ Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

² Temporary impacts are due to dredging Delta channels.

1 The majority of the impacts on wetlands and waters of U.S. are on tidal channels, emergent
2 wetlands, and on wetlands and waters found within cultivated lands (agricultural ditches and
3 seasonal wetlands). These impacts mostly result from dredging work, spoils areas, and canal
4 construction. The impacted seasonal wetlands mapped within the Conveyance Planning Area, as
5 described in Section 12.3.2.4 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions, of this
6 RDEIR/SDEIS, all occur in the central Delta within plowed agricultural fields.

7 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
8 functions due to construction activities are fully compensated. Wetland functions are defined as a
9 process or series of processes that take place within a wetland. These include the storage of water,
10 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
11 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
12 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
13 do they perform all functions equally well. The location and size of a wetland may determine what
14 functions it will perform. For example, the geographic location may determine its habitat functions,
15 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
16 quality functions. Many factors determine how well a wetland will perform these functions: climatic
17 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
18 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
19 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
20 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
21 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
22 ground and nursery for numerous species. Many endangered plant and animal species are
23 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
24 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
25 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
26 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
27 include the trapping of sediment, pollution control, and the biochemical processes that take place as
28 water enters, is stored in, or leaves a wetland.

29 The functions of the waters of the U.S. that will be temporarily or permanently impacted by this
30 alternative vary greatly depending primarily on existing land uses and historical levels of
31 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
32 maintained and often devoid of vegetation, support only minimal hydraulic function (water
33 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
34 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
35 quality functions (e.g. reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
36 channels affected by this alternative support functions in all three categories, but the level at which
37 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
38 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
39 disturbance due to past land uses. Although these features likely support habitat, water quality, and
40 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
41 depending on the overall ecological setting and level of disturbance. Functions associated with
42 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
43 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
44 waterway, these features are expected to function at a high level. However, where these habitats
45 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
46 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As

1 such, their habitat functions have been greatly compromised, but they retain some water quality and
2 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
3 areas; however the depressions may support wetland vegetation at their edges. The areas mapped
4 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
5 relatively small, each lake is likely performing functions from all three categories.

6 A functional assessment of wetlands proposed for fill will be conducted during the development of
7 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
8 assessment will be compared to the expected functions at the proposed mitigation site(s) such that
9 it can be confirmed that the compensatory mitigation will in fact accomplish full functional
10 replacement of impacted wetlands. All impacted wetlands will be replaced with fully functional
11 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
12 hydrologic/hydraulic function. Since many impacted wetlands will be significantly less than high
13 function, the compensatory mitigation will result in a net increase in wetland function.

14 Alternative 9 was designed to avoid waters of the U.S. to the maximum extent practicable. Each of
15 the conveyance components has been located in upland areas where it was feasible to do so. Once
16 construction begins, specific measures will be implemented, as described in the AMMs set out in
17 Appendix 3.C, Avoidance and Minimization Measures, of the Draft BDCP and in Appendix D,
18 Substantive BDCP Revisions, of this RDEIR/SDEIS (AMM6), to further avoid and minimize effects to
19 waters of the U.S. as well as to special-status species. The AMMs will be implemented at all phases of
20 a project, from siting through design, construction, and on to operations and maintenance. The
21 AMMs that pertain specifically to waters of the U.S. are 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, AMM10 Restoration of Temporarily Affected Natural
26 Communities, AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and Alignment
27 Guidelines, AMM34 Construction Site Security, and AMM36 Notification of Activities in Waterways.

28 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
29 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
30 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, will also
31 result in further avoidance and minimization of effects to waters of the United States.

32 Aside from wetland habitats that would be created as a result of implementing CMs 4-10, some of
33 which could serve the dual purpose of offsetting effects to species and mitigating impacts on waters
34 of the U.S., more specific mitigation is required to ensure that there is no net loss of wetland
35 functions and values as a result of implementing Alternative 9 pursuant to USACE's and U.S. EPA's
36 Mitigation Rule (see Section 12.2.1.1 in Appendix A, Draft EIR/EIS In-Text Chapter Revisions of this
37 RDEIR/SDEIS). Mitigation Measure BIO-176, Compensatory Mitigation for Fill of Waters of the U.S.
38 would be available to address adverse impacts on waters of the U.S.

39 **NEPA Effects:** The permanent and temporary loss of these ~~potential~~ jurisdictional wetlands and
40 waters as a result of constructing Alternative 9 water conveyance facilities would be a substantial
41 effect if not compensated by wetland protection and/or restoration. This loss would represent a
42 removal of federally protected wetlands as defined by Section 404 of the CWA. ~~However, Alternative~~
43 ~~9 includes conservation measures (CM4 and CM10) that would restore and protect large acreages of~~
44 ~~both tidal and nontidal wetlands and open water in the study area. Through the course of the BDCP~~

1 restoration program, this alternative would restore 65,000 acres of tidal and 1,200 acres of nontidal
2 wetland or open water. Impacts to wetlands from CM1 construction would occur in the first 10 years
3 after BDCP approval. Approximately 19,550 acres of this wetland restoration would occur during
4 this time period, thereby offsetting the impacts of CM1 construction. Alternative 9 will implement
5 AMMs 1-7, 10, 12, 30, 34, and 36, which would avoid and minimize fill of wetlands and waters and
6 any indirect effects to wetlands and waters. However, specific mitigation would be required to
7 ensure that Alternative 9 does not result in a loss of functions and values of waters of the U.S. and
8 thus that the affect is not adverse. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of*
9 *Waters of the U.S.*, would be available to reduce these effects such that they are not adverse. These
10 acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for Alternative 9 (1,569
11 acres). Therefore, there would be an overall beneficial effect on potential jurisdictional wetlands and
12 other waters of the United States from Alternative 9 implementation.

13 **CEQA Conclusion:** The permanent and temporary loss of these jurisdictional wetlands and waters of
14 the U.S. as a result of constructing Alternative 9 water conveyance facilities would be a significant
15 impact. Specific mitigation would be required to ensure that Alternative 9 does not result in a loss of
16 functions and values of waters of the U.S. Mitigation Measure BIO-176, *Compensatory Mitigation for*
17 *Fill of Waters of the U.S.*, would be available to reduce the impact to a less-than-significant level.
18 Additionally, Alternative 9 does propose to restore up to 76,721 acres of wetland natural
19 communities under the Plan, which would include 65,000 acres of tidal marsh restoration (CM4),
20 10,000 acres of seasonally inundated floodplain restoration (CM5), 21 acres of vernal pool/alkali
21 seasonal wetlands (CM9; 67 acres of vernal pool complex and 72 acres of alkali seasonal wetland
22 complex assuming a wetland density of 15%), and 1,700 acres of nontidal marsh restoration
23 (CM10). In addition, Alternative 9 would restore 5,000 acres of riparian habitat (CM7), some portion
24 of which may also qualify as forested or scrub-shrub wetland. In addition, 20 miles of levees will
25 have channel margin enhancement conducted on them (CM6), which would include improving
26 channel geometry and restoring riparian, marsh, and mudflat habitats on the water side of levees.
27 Impacts on wetlands from CM1 construction would occur in the first 10 years after BDCP approval.
28 Approximately 20,065 acres of this wetland restoration would occur during this time period.

29 The success in implementing these Conservation Measures would be assured through effectiveness
30 monitoring, which includes success criteria, and adaptive management as outlined in the *Adaptive*
31 *Management and Monitoring* sections of the Draft BDCP for tidal marsh restoration (Draft BDCP
32 Section 3.4.4.4), seasonal floodplain restoration (Draft BDCP Section 3.4.5.4), channel margin
33 enhancement (Draft BDCP Section 3.4.6.4), valley/foothill riparian restoration (Draft BDCP Section
34 3.4.7.4), vernal pool and alkali seasonal wetland complex restoration (Draft BDCP Section 3.4.9.4),
35 and nontidal marsh restoration (Draft BDCP Section 3.4.10.3). All restored areas will be secured in
36 fee-title or through conservation easements.

37 Alternative 9 would also result in the protection and management of the following natural
38 communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool
39 complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50
40 acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands
41 will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and
42 agricultural ditches.

43 The Plan under Alternative 9 would also implement AMMs 1-7, 10, 12, 30, 34, and 36, which would
44 avoid and minimize fill of waters of the U.S. and any indirect effects to wetlands and waters. As
45 stated above, specific mitigation would be required to ensure that Alternative 9 does not result in a

1 loss of functions and values of waters of the U.S. Mitigation Measure BIO-176, *Compensatory*
2 *Mitigation for Fill of Waters of the U.S.*, would be available to reduce the impact to a less-than-
3 significant level.

4 ~~The permanent and temporary loss of potential jurisdictional wetlands as a result of constructing~~
5 ~~Alternative 9 water conveyance facilities would be a substantial effect if not compensated for by~~
6 ~~wetland protection and/or restoration. This loss would represent either temporary or permanent~~
7 ~~removal of federally protected wetlands or other waters of the United States as defined by Section~~
8 ~~404 of the CWA. However, Alternative 9 includes conservation measures (CM4 and CM10) that~~
9 ~~would restore and protect large acreages of both tidal and nontidal wetlands and open water.~~
10 ~~Through the course of the BDCP restoration program, this alternative would result in restoration of~~
11 ~~65,000 acres of tidal and 1,200 acres of nontidal wetlands and open water. Impacts to wetlands from~~
12 ~~CM1 construction would occur in the first 10 years after BDCP approval. Approximately 19,550~~
13 ~~acres of this wetland restoration would occur during this time period, thereby offsetting the impacts~~
14 ~~of CM1 construction. These acreages greatly exceed the no net loss (1:1 replacement ratio)~~
15 ~~requirement for Alternative 9 (1,565 acres). Therefore, there would be a beneficial impact on~~
16 ~~potential jurisdictional wetlands and other waters of the United States resulting from Alternative 9~~
17 ~~implementation.~~

18 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.**

19 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
20 success monitoring, long-term preservation, and long-term maintenance and monitoring
21 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
22 replace lost function through the mechanisms discussed below which will result in restoration
23 and/or creation of habitat with at least as much function and value as those of the impacted
24 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
25 than that of impacted habitat.

26 Compensation ratios are driven by type, condition, and location of replacement habitat as
27 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
28 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
29 accept preservation as the only form of mitigation; use of preservation as mitigation typically
30 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
31 minimum of 1:1, depending on the factors listed above.

32 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
33 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
34 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
35 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
36 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
37 combination of the following methods:

- 38 ● Purchase credits for restored/created/rehabilitated habitat at an approved wetland
39 mitigation bank;
- 40 ● On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
41 converted to uplands due to past land use activities (such as agriculture) or functionally
42 degraded by such activities;
- 43 ● On-site (adjacent to the project footprint) creation of aquatic habitat;

- 1 • Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
2 due to past land use activities (such as agriculture) or functionally degraded by such
3 activities;
- 4 • Off-site (within the Delta) creation of aquatic habitat; and/or
- 5 • Payment into the Corps' Fee-in-Lieu program.

6 Purchase of Credits or Payment into Fee-in-Lieu Program

7 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
8 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
9 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
10 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
11 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
12 these categories.

13 On-Site Restoration, Rehabilitation and/or Creation

14 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
15 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
16 could occur immediately adjacent to the project footprint. It is anticipated that some of the
17 compensatory mitigation will fall into this category.

18 Off-Site Restoration, Rehabilitation and/or Creation

19 There exists, within the immediate vicinity of the project area, Delta land which has been subject
20 to agricultural practices or other land uses which have degraded or even converted wetlands
21 that existed historically. Sites within the Delta will be evaluated for their restoration,
22 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
23 mitigation will fall into this category.

24 Compensatory mitigation will result in no net loss of acreage of Waters of the U.S. and will
25 accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
26 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
27 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
28 at significantly less than high levels, the compensatory mitigation will result in a significant net
29 increase in wetland function.

30 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**
31 **Wetlands and Other Waters of the United States**

32 The habitat protection and restoration activities associated with Alternative 9's other conservation
33 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and Waters of
34 the United States-U.S. in the study area during the course of BDCP conservation action
35 implementation. Because these conservation measures have not been defined to the level of site-
36 specific footprints, it is not possible to delineate and quantify these effects in detail. Several of the
37 conservation measures (CM2, CM4, and CM5) have been described with theoretical footprints for
38 purposes of the effects analysis contained in BDCP Chapter 5, Effects Analysis, of the Draft
39 BDCP.Effects Analysis.

1 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
2 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
3 from CM2-CM10 were analyzed by looking at effects on wetland natural communities mapped
4 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
5 predominantly wetland natural communities listed in Appendix 12E found in Appendix A, Draft
6 EIR/EIS In-Text Chapter Revisions, of this RDEIR/SDEIS and that 10% of all of the non-wetland
7 natural communities listed in that table would qualify as wetlands or other waters of the United
8 States under the CWA. Based on this approach approximately 19,850 acres of potentially
9 jurisdictional wetlands and waters could be affected by CM2-CM10. The majority of these impacts
10 are attributable to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4,
11 which would likely result in an improvement of wetland function in the Plan Area.

12 ~~These theoretical footprints have been used to predict the acres of natural communities that would~~
13 ~~be affected through loss or conversion, which gives some indication of jurisdictional wetland effects.~~
14 ~~Any CM2–CM10 effects ascribed to tidal perennial aquatic, tidal brackish emergent, tidal freshwater~~
15 ~~emergent, other natural seasonal, nontidal freshwater perennial emergent, and nontidal perennial~~
16 ~~aquatic wetlands natural communities are likely to also be effects on wetlands and other Waters of~~
17 ~~the US. Effects ascribed to other natural communities and land cover types with small jurisdictional~~
18 ~~wetland components (valley/foothill riparian, alkali seasonal wetland complex, vernal pool complex,~~
19 ~~managed wetland, grassland and cultivated land) are not easily converted to effects on wetlands and~~
20 ~~other Waters of the US by the use of theoretical footprints. Because of this lack of detail, a~~
21 ~~programmatic assessment is provided for these other conservation measures.~~

22 **NEPA Effects:** ~~The conversion of existing wetland natural communities to other types of wetland~~
23 ~~natural communities through implementation of CM2–CM10 for Alternative 9 would be~~
24 ~~approximately 19,850 acres~~ ~~the range of 5,500 to 6,000 acres, assuming that 100% of the~~
25 ~~predominantly wetland natural communities listed in Table 12-9-69 and that 10% of all of the non-~~
26 ~~wetland natural communities listed in that table would qualify as wetlands or other Waters of the~~
27 ~~US under the CWA. Most of these wetlands would be converted to tidal and nontidal wetlands and~~
28 ~~open water through implementation of CM4, and CM10. Although the increase in wetland acreage~~
29 ~~and wetland functions from these restoration actions could in part offset the effects on waters of the~~
30 ~~U.S. occurring in these areas, implementation of Mitigation Measure BIO-176, *Compensatory*~~
31 ~~*Mitigation for Fill of Waters of the U.S.*, would be required to ensure that these effects are not~~
32 ~~adverse.~~ ~~The wetlands and open water created by these two restoration actions would be~~
33 ~~approximately 66,200 acres, far exceeding what is required under the no net loss policy used by the~~
34 ~~USACE in considering Section 404 permits, even if one were to assume that all conversions~~
35 ~~represented a functional wetland loss. Therefore, there would be a beneficial effect on potential~~
36 ~~jurisdictional wetlands and other Waters of the US from implementing CM2–CM10.~~

37 **CEQA Conclusion:** The conversion of existing wetland natural communities to other types of
38 wetland natural communities through implementation of CM2–CM10 for Alternative 9 would be
39 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
40 water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities
41 would be restored under Alternative 9. Although the increase in wetland acreage and wetland
42 functions from these restoration could in part offset the effects on waters of the U.S. occurring in
43 these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of*
44 *Waters of the U.S.*, would be required to ensure that the impacts are reduced to a less-than-
45 significant level.

1 ~~The permanent and temporary loss of potential jurisdictional wetlands as a result of implementing~~
2 ~~the other conservation measures (CM2–CM10) of Alternative 9 would be a substantial effect if not~~
3 ~~compensated for by wetland protection and/or restoration. This loss would represent a removal of~~
4 ~~federally protected wetlands or other Waters of the US as defined by Section 404 of the CWA.~~
5 ~~However, Alternative 9 includes conservation measures (CM4 and CM10) that would restore large~~
6 ~~acreages of both tidal and nontidal wetlands and open water in the study area. Over the life of the~~
7 ~~BDCP restoration program, this alternative would result in restoration of 66,200 acres of tidal and~~
8 ~~nontidal wetlands and open water, of which 19,550 acres would be restored in the first 10 years.~~
9 ~~These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for Alternative 9~~
10 ~~(5,500–6,000 acres). Therefore, there would be a beneficial impact on potential jurisdictional~~
11 ~~wetlands and other Waters of the US from implementing CM2–CM10 under Alternative 9.~~

12.3.3.19 Impacts Applicable Across Multiple Alternatives

The following impacts and conclusions are applicable across alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, and 9. The Draft EIR/EIS did not include NEPA determinations for Impacts BIO-69 *Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill Crane* and BIO-70 *Effects on Greater Sandhill Crane Associated with Electrical Transmission Facilities* for all alternatives and so brief summary analyses for those alternatives and the NEPA determinations are presented below. The original CEQA conclusions for these impacts that appear in the Draft EIR/EIS have not changed.

The data supporting the analysis of Impact BIO-176 *Effects on Wetlands and Other Waters of the United States* has been updated for all alternatives and therefore a brief summary discussion of these effects and updated NEPA and CEQA conclusions are provided.

The analyses for these impacts for Alternative 4 are presented above in this Appendix and can be found in Section 4.3.8 in this RDEIR/SDEIS for Alternative 4A. These impacts are also generally discussed in Sections 4.4.8 and 4.4.9 for Alternatives 2D and 5A, respectively.

Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill Crane

The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676 acres of foraging habitat for greater sandhill crane. Alternatives 1A through 9 would result in the permanent loss of and temporary effects on between 0 and 823 acres of roosting and foraging habitat (up to less than 3% of the total habitat in the study area) and between 3,716 and 12,021 acres of foraging habitat (up to 7% of the total habitat in the study area) for the greater sandhill crane during the term of the Plan. However, the implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites would be directly affected by water conveyance facilities including transmission lines and associated footprints. In addition, temporarily removed habitat would be restored within 1 year following construction. However, it would not necessarily be restored to its original topography and it could result in the conversion of cultivated lands to grasslands.

The Plan includes conservation commitments through *CM3 Natural Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least 7,300 acres of high- to very high-value foraging habitat for greater sandhill crane (Objective GSHC1.1).

Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise and local seasonal flood events. These wetlands would be created within 2 miles of existing permanent roost sites and protected in association with other protected natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill

1 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
 2 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
 3 large patch sizes of these wetland complexes would provide additional conservation to address the
 4 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
 5 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
 6 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
 7 active cornfields that are flooded following harvest to support roosting cranes and also provide the
 8 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
 9 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
 10 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
 11 loss.

12 The BDCP would protect 7,300 acres of high- to very high-value greater sandhill crane foraging
 13 habitat by the late long-term timeframe with at least 80% maintained in very-high value types in
 14 any given year (Objective GSHC1.1). These acres of protected foraging habitat would be located
 15 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level rise and
 16 local seasonal flood events, greater Sandhill crane population levels, and the location of foraging
 17 habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives GSHC1.1
 18 and GSHC1.2). Because agricultural habitat values change over time based largely on economically
 19 driven agricultural practices, protecting crane habitat would provide enhanced stability to
 20 agricultural habitat value within the crane use area that does not currently exist. Alternatives that
 21 impact more than 7,300 acres of foraging habitat (1A- 1C, 2A-2C, 6A-6C) have associated mitigation
 22 measures which require compensation at a ratio of 1:1 (protection:impacted) for loss of foraging
 23 habitat.

24 All alternatives also include 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 Appendix 3.C, *Avoidance and Minimization Measures*, in the Draft BDCP and in
 31 Appendix D, Section D.3.3, of the RDEIR/SDEIS.

32 **NEPA Effects:** The loss of greater sandhill crane habitat would not be adverse under NEPA under
 33 Alternative 1A through Alternative 9 because the BDCP proponents have committed to avoiding and
 34 minimizing effects by avoiding greater sandhill crane roost sites, and by restoring and protecting the
 35 acreages of roosting and foraging habitat described above. This habitat protection, restoration,
 36 management, and enhancement would be guided by performance standards, and by AMM1-AMM7,
 37 AMM20, and AMM30 which would be in place throughout the period of construction. Considering
 38 these commitments, greater sandhill crane habitat losses and conversions under Alternatives 1A
 39 through Alternative 9 would not be an adverse effect.

40 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission** 41 **Facilities**

42 Greater sandhill cranes are susceptible to collision with power lines and other structures during
 43 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,
 44 Brown and Drewien 1995, Manville 2005). New transmission lines installed in the study area could

1 increase the risk for bird-power line strikes, which could result in injury or mortality of greater
2 sandhill cranes. Both permanent and temporary electrical transmission lines would be constructed
3 to supply construction and operational power to Alternatives 1A-1C, 2A-2C, 3, 5, 6A-6C, 7, 9, and 9.
4 The Alternative 4 facilities would require the installation of temporary transmission lines extending
5 north and south along the water conveyance alignment. Temporary lines would be removed after
6 construction of the water conveyance facilities, within 10-14 years.

7 The existing network of power lines in the study currently poses a risk for sandhill cranes, as both
8 distribution and transmission lines cross over or surround sandhill crane roost sites in the study
9 area. New transmission lines would temporarily increase this risk and have an adverse effect on the
10 species in the absence of other conservation actions. Marking transmission lines with devices that
11 make the lines more visible to birds has been shown to dramatically reduce the incidence of bird
12 mortality, including for sandhill cranes. Yee (2008) estimated that marking devices in the Central
13 Valley would reduce crane mortality by 60%. In addition, the current proposed transmission line
14 alignments are not fully designed, and line locations are not final. The implementation of *AMM20*
15 *Greater Sandhill Crane* would require that the final transmission line alignment under any
16 alternative would eliminate the potential for take of greater sandhill cranes in the Plan Area per
17 Section 86 of the California Fish and Game code. This would be achieved by implementing any
18 combination of the following: (1) siting new transmission lines in lower bird strike risk zones; (2)
19 removing, relocating or undergrounding existing lines; (3) installing flight diverters on existing lines
20 in the crane winter use area; and/or (4) for areas outside of the Stone Lakes National Wildlife
21 Refuge project boundary, shifting locations of flooded areas that provide crane roosts to lower risk
22 areas. This would be expected to reduce existing mortality and thus fully offset the overall
23 population effects of new transmission lines. Designing the alignment to minimize risk and
24 removing, relocating, or undergrounding existing lines would be given priority out of the above
25 methods. In addition, undergrounding of all new permanent power lines would be comprehensively
26 evaluated during the final power line design process. With these measures, and considering that the
27 temporary lines would be removed within the first 10-14 years of project implementation (under
28 any alternative), the potential for take of greater sandhill crane would be eliminated per Section 86
29 of the California Fish and Game code.

30 **NEPA Effects:** The construction of new transmission lines would not result in an adverse effect on
31 greater sandhill cranes because, implementation of *AMM20* would eliminate the potential for take
32 per Section 86 of the California Fish and Game code. With *AMM20 Greater Sandhill Crane*, and
33 considering that the temporary lines would be removed within the first 10-14 years of project
34 implementation, the potential for take of greater sandhill cranes would be eliminated.